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EDITORIALS

PUBLIC HEALTH AND PUBLIC HYSTERIA.

"MAN LIVES" wrote the shrewd and sunny Stevenson "not by bread alone, but mainly by catch-words." In that quaintly expressed truth is found one potent obstacle to hygienic progress. Because the public, led astray by the fear of a word, misbelieves or disbelieves the true danger, we must, perforce, waste strength in fighting shadows, while the real enemy exacts its ceaseless toll of life, all but unchecked.

Take an extreme case. Only a few years ago a wretched alien leper was harried from state to state in this supposedly enlightened country, until he met a miserable death from terror and exposure, incidentally scaring several hysterical cities quite out of their wits. One of those cities, without alarm or shame, had suffered several years of typhoid fever with a mortality some two hundred per cent. greater than the average rate for this nation. Another, just before the leper's advent, had undergone an epidemic of whooping-cough, which materially helped to fill the cemeteries with little graves, but which created no particular comment because it was "only whooping-cough"—as if a person dead of one disease were not exactly as dead as a person dead of any other. Again, a third

community, which rose in panic against the leprous fugitive, was then, and is now, notorious for its needlessly high infant mortality. Yet, in the face of real and persistent perils, these places shrank horrified from a casual and baseless threat.

Why? Because the word "leprosy" is made a synonym for terror in the most widely read of all books, the Bible. It is impossible to ascribe the panics to any other cause. Not one American in ten thousand has ever seen a case of leprosy, or knows from personal knowledge, anything of the disease. Never has it gained any foot-hold in this country; there is no reason to believe that it ever will or can. The man with a sore throat—yes, or with an inflamed eye—who brushes against you in a street-car or uses the public drinking cup or towel before you, is a more real peril than any leper. But the leper has upon him the brand of our profoundest tradition. He is marked with the terror of a word.

With cholera the case is at least more apparently logical, in that the great Asiatic pest has reaped its harvest in America in the past. That it will ever again break through our defenses and establish itself, is not more probable than that New York will be destroyed by a tidal wave or Chicago by an earthquake. Nevertheless, there is a panic power in its name. Who can doubt that if a hundred cases of cholera were to appear in various parts of the country, the government's health authorities could have a million dollars to fight it? How much can they get today to handle the hundred thousand dangerous cases of tuberculosis scattered abroad throughout the nation?

When one of our recurrent cholera scares was winging its high-typed way through the daily papers, the health officer of a "threatened" city was visited by a reporter.

"Your paper" said the official "printed a scare-head article today about the Asiatic peril at our doors".

"Yes" said the reporter: "What's new?"

"I've got a better story for you".

"Produce it."

"A graver peril to the city," continued the public's physician, "far graver and far less easily coped with. In fact, I don't mind telling you privately, we're at our wit's end, officially, in the matter."

"Well?" said the newspaper man impatiently.

"There are over a hundred cases of tuberculosis in the Devil's Hollow Tenements," answered the physician, portentously.

The reporter laid his pencil on his paper and regarded the physician with suspicion.

"Is that an unusual number?" he asked.

"No; its quite usual."

"Then where's your good story?"

"That is."

"What?"

"That it's usual."

The reporter took it under consideration. "I see," he said at length, "but I don't think my paper will see."

And it didn't. It never does. Fear is news. The basis for fear is not.

Semi-hysterical dread still attaches to certain diseases, over others equally or almost equally dangerous. Say "scarlet fever" to the average mother of a family, and she turns pale. Try her with "measles" or "whooping-cough" and, unless she is exceptionally well informed, she will laugh off the prospect with some reference to the "unavoidable diseases of childhood." From the purely individualistic standpoint she is right. If scarlet fever invades her family, the danger is greater than in the case of the so-called "unimportant diseases." But the family is not an isolated unit. It is open by a thousand media of communication to the influences of its community, and once measles or whooping-cough has gained a start in the community, the peril to every family is as great as from scarlet fever. If statistics show anything, they show that each of these "unavoidable diseases of childhood," (a phrase which itself embodies both ignorance and cowardice) whooping-cough and measles, is practically as deadly as the dreaded scarlet fever—dreaded because the public has been misled again by the terror of a word.

Worst of all is that form of hysteria which, for want of a better term, I may call the hysteria of prudery. Hygienists are agreed that, with the exception of tuberculosis, venereal disease is the profoundest peril to health which we have to face in this country. How do we face it? Generally speaking, we don't face it at all. We turn our backs on it, and cover our eyes, and a good many of us emit modulated and well-bred shrieks to indicate that we are properly shocked. Meantime our children grow up uneducated and undefended, except for such casual information or misinformation as they may derive from curious and often purient fellow-ignorance. That the atmosphere is clearing, there can fortunately be no doubt. A speaker may deal frankly with sex-hygiene, today, on platforms from which he would have been angrily driven a few years ago. Newspapers, which have been virtuously indignant at the mere idea of mentioning "private diseases," (except in quack advertisements, heavily paid for) will now print, more or less guardedly, the warnings of medical officialdom; and many of them have even cast out the quacks. Within a

year a hygienist of national reputation has been invited to speak before several women's clubs on this vital topic.

But it does not follow that proper publicity is yet obtained, or that the general public has been educated, even to the point of receptivity. Not long since, the physical director of one of the greatest American colleges prepared a course of lectures to the students on personal hygiene, two of which were to be devoted to venereal disease. After the delivery of the first lecture such a storm of protest was stirred up, mainly by the wives of the trustees and the faculty, that the second address was abandoned.

Again, a certain semi-official organization requested an expert on public health topics to deliver a lecture to college men at various institutions, giving them practical advice as to the avoidance of prevalent diseases.

"Very well" said the man. "On one condition, that I be permitted to treat venereal diseases with the same frankness as tuberculosis or typhoid."

The request, while not actually withdrawn, was allowed to lapse. The hysteria of prudery was too much feared.

In the matter of the hysterical attitude toward venereal disease, there is a wheel within a wheel. The idea that of the two diseases, syphilis is incalculably the worse, and gonorrhea rather unimportant, is a fallacy of the widest acceptation. In fact, there does not inhere in leprosy itself more of the terror of a word than in syphilis. Yet, by and large, and with particular reference to innocent wives infected by their husbands, it is quite certain that as much damage is inflicted on the race by the little-considered infection as by the superstitiously-dreaded affliction. Syphilis can now be, in many cases, absolutely cured. But no man knows when gonorrhea, apparently eradicated, may reassert itself to the wreckage of the patient's life and the health of those dearest to him. To reconstruct the hysterical fear of syphilis into the just and logical dread due equally to both the sexual diseases, is perhaps the most vital problem of modern hygienic education.

It all resolves itself into a question of education; patient, unremitting instruction of the public, through the press, the platform, the pulpit, and the schools. Nowhere as in hygiene is that public capacity so needed which Bacon has set down as one part of wisdom, the capacity to learn, not from the names of things, but from things themselves.

SAMUEL HOPKINS ADAMS,
Auburn, N. Y.

SPECIAL ARTICLES

EXPERIMENTS IN BOOK DISINFECTION.*

By L. B. NICE, Ph. D.,
Harvard Medical School.

In the January issue of this Journal, Dr. W. L. Beebe described a method for disinfecting books by carbo-gasoline. He recommended that books be immersed for twenty minutes in a 2 per cent. solution of carbolic acid in 88 Baümé gasoline. He made 65 inoculations using bouillon cultures and obtained growth in only one case.

In order to test this method I autoclaved several books, dried them in a sterile chamber, and inoculated them twenty pages apart, with loopfuls of agar, or bouillon cultures. The books were again placed in a sterile chamber, for forty-eight hours, that the cultures might thoroughly dry, in order to prevent danger of the organisms being washed off. They were then left in 88° Baümé gasoline saturated with carbolic acid (about a 2 per cent. solution) for one hour and then dried for ninety-six hours to let all the gasoline evaporate before cultures were made. Eighty inoculations were made; twenty-five of *B. coli communis*, twenty-seven of *Staphylococcus pyogenes aureus*, and twenty-eight of *B. diphtheriae*. Fifty-seven of these grew; fifteen of *B. coli*, seventeen of *Staphylococcus pyogenes aureus*, and twenty-five of the *B. diphtheriae*.

In order to determine whether saturated carbo-gasoline will kill bacteria when it is in direct contact with them, three test tube cultures each of *B. coli communis*, *Staphylococcus pyogenes aureus*, and *B. diphtheriae* were filled with carbo-gasoline. This was drawn off after one hour and ten minutes, and ninety-six hours later cultures were made. Growth occurred in two of the *B. coli* test tubes, in two of the tubes of *Staphylococcus pyogenes aureus* and in one of the diphtheria tubes.

The lack of growth in Beebe's experiments was probably due to his bouillon cultures being washed off by the gasoline, since two of his books were only dried one hour and the third not at all. In my own experiments, although the books were dried for forty-eight hours, growth occurred in 80 per cent. of the agar and 25 per cent. of the bouillon cultures.

*These experiments were made in the biological laboratory of Clark University, Worcester, Mass.

After repeated trials it was found to be impossible to make a stronger solution of carbolic acid in gasoline than about 2 per cent., so there seems to be no way of modifying the carbo-gasoline method to make it effective.

Various other methods have been recommended for disinfecting books. Steam kills the bacteria but injures the books. The same objection applies to dry hot air, for it must be used at a very high temperature in order to disinfect. Formalin is used for this purpose to a large extent but it has been shown by many investigators to be entirely ineffective, since gas cannot penetrate between the leaves of a book, no matter by what devices they are held apart.

Moist hot air is an entirely satisfactory disinfectant; for it kills all the bacteria, it does not injure the books and is inexpensive and easy to use. This method was perfected by Xylander and Findel working independently. Xylander's work is especially thorough, for he made more than a thousand inoculations. A temperature of 78° to 80° C. and 30 per cent. to 40 per cent. moisture for thirty-two hours will kill all non-spore bearing bacteria in closed books, even thick layers of tubercle bacilli, and does not injure the most delicate bindings in any way, even after months of disinfection. A higher temperature than 80° C. and more moisture than 40 per cent. is injurious to books. When a pile of books is being disinfected, a small thermometer should be placed in a thick book in the middle of the pile. The disinfection should be counted as begun when this thermometer reaches 70° C. which may be twelve hours after the thermometer on the door registers 80° C. The disinfection must continue for thirty-two hours in order to kill all the bacteria. I had perfect success with this method in more than seventy tests.

The apparatus necessary is simple. It consists of a double walled case of galvanized iron, with water filling the space between the walls. There are two doors, the inner of glass and the outer of galvanized iron. A thermometer and hygrometer are fastened to the inside of the glass door, so that they can be read without opening the apparatus. The shelves for the books may be of perforated galvanized iron or of wire. The moisture is supplied by a water pipe opening near the bottom of the disinfector so that the water drips slowly into a flat dish of porous material, such as unglazed clay or tile. This becomes saturated and gives up its moisture in the form of vapor. Heat is furnished from beneath by gas, gasoline, or oil burners. In such an apparatus, two feet wide, two feet deep, and three feet high, 300 to 400 school books can be disinfected at one time.

School books ought to be disinfected by the moist hot air method during vacations. Library books that are much in use should be disinfected at regular intervals. Boards of health should report daily to

schools and libraries all cases of contagious diseases, such as scarlet fever, whooping-cough, typhoid, dysentery, erisipelas, diphtheria, venereal diseases, smallpox and tuberculosis, and all books used by such patients should be disinfected by moist hot air.

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PRACTICAL MUNICIPAL MILK EXAMINATIONS.

By D. M. LEWIS, M. D.,
New Haven, Conn.

Much has been written concerning the bacteriological and cellular content of milk, and in how far counts thereof are accurate. Four years ago, under Dr. A. C. Abbott, of Philadelphia, we learned the technique and value of the Stewart centrifugal method, and we have since applied it to an average of 3,000 specimens yearly; after the first year, making the hard and fast rule that the presence of pus and streptococci combined in any sample should immediately result in shutting the source of that sample from the market until the trouble had been rectified, as shown by a second microscopical examination. The presence of dirt in consecutive samples, as shown by the presence of *B. subtilis* and allied organisms, together with confirmatory data from farm inspection, also came under the same rule unless attempts were made to correct the conditions. Otherwise, findings of pus alone, streptococci alone, blood, occasional dirt, or any combination of these, resulted in a warning being sent to the producer, which stated the findings and requested that the cause be located and corrected. Out of 500 producers, six went out of business the first year rather than clean up, while two discontinued business rather than locate infected milk. Since then we have had immediate response to requests for the correction of even minor troubles, and in every case but one, the source of the infected milk was located, usually by the producer, and less often by a veterinary. The one exception noted was in the case of a cow which showed nothing on physical examination and which was voluntarily cut out of the herd by the producer and sold for beef.

The first year, whenever pus or pus-producing organisms were found in any mixed sample of milk, we examined samples from individual cows, or from an entire herd if the producer suspected no particular animal, controlling the results by testing the herd individually before and after the trouble was located. In the majority of cases the producer picked out the animal at fault, while in a minor number corroboration of results was given by veterinarians.

By pus and streptococci we mean a very definite picture, i. e., the presence of polymorphonuclear leucocytes in any number whatsoever, but clumped,—that is, held together by the fibrin content. We regard only the

long chain variety of streptococci, of a type of which we shall mention later, as significant. In making smears of milk sediments by the Stewart method, we may find a stringy sediment which will give masses of pus cells from dozens to hundreds in the field, or we may find a sediment which is not ropey, but which shows on an average a half dozen pus cells, clumped. This, we most frequently find, depends on the volume of milk from which the sample came; that is, whether it was from the mixed milk of a small producer, or, on the other hand, whether it came from the mixed milk of one or more of the larger producers,—frequently, for example, from the mixed product of a dairy. In some cases pus in milk has been traced to tuberculous cows, in other cases to cows whose teats had been bruised. In such cases, a sample from the individual cow has shown the characteristic picture, not of small clumps, but of large clumps, where experienced judgment is not needed to say that there is some real trouble. In this connection we would emphasize the point that there are samples which show the characteristic clumped pus cells, but no streptococci. Incubation of such samples shows the causative organism. In a less proportion of cases where pus and streptococci are found, we find the presence of endothelial as well as polymorphonuclear neutrophilic cells; a picture not like the definite one previously described. These cases we have followed up and found all of them, thus far, to be from cows from two to five months previous to calving which have previously had garget, or which are out of condition, or tuberculous. In but one specimen out of 12,000 have we found the presence of staphylococci with pus. In a minor number we have found the prevailing pus cell not the neutrophile, but the eosinophile. In regard to what that picture represents, other than indicating inflammation, we have no data to offer.

Pus alone has resolved itself, either into a picture of clumped polymorphonuclear cells, where, on incubation, we find the causative organism, or one with isolated polymorphonuclear cells, the number of which may be hundreds per field. Yet in no case has the streptococcus been found in the latter picture, even on incubation, nor has evidence of cow trouble been found on physical examination. In some milk sediments we found a cell similar to the polymorphonuclear in size, but mononuclear and of nongranular protoplasm. This type of cell we have never found clumped, nor have we been able to trace any cow trouble in such milks, even where the cell content may be hundreds per field.

Streptococci alone furnish a large field for investigation. There are apparently numerous varieties of short and long chain streptococci. Of the former there is one type where the individual cocci in the chain are of varying size; these we class with the dirt organisms. The other common

type, where the individual cocci are of even size and small, we believe are forms of the lactic acid bacillus. Similarly, with the long chain streptococci we feel sure of two types: the first type, where the individual cocci are of the same size, and where the chains are coiled, we have yet to find without the association of pus cells, though, as we have stated, where pus cells alone are present, we may find them only on incubation. In the second type, the streptococci are similar to the varying sized individual cocci of the short chain variety and like them are classed as dirt organisms. Frequently one finds straight long chains of even sized streptococci but the chains are not as long, they are not found coiled, and have quite a different appearance from either of the two varieties previously mentioned. We have not found any cow trouble where such streptococci have been present in milk samples, nor have we discovered such a finding in milk samples which have been sent to the laboratory from sick rooms. We attach no importance to this type of streptococci in milk smears.

To summarize: One may examine the majority of specimens of market milk by the smear method and find them without appreciable cell content, and often without any demonstrable bacterial content, while the minority will give pictures such as we have described, and the samples from individual cows will give the same contrasting pictures, thus furnishing data by which infected cows can be discovered and isolated. We therefore believe that we have the most practical, quickest, and above all, an exceedingly thorough method, for demonstrating clean and contaminated milk.

The following is a common experience which illustrates the lack of value of numerical counts alone: A sample of milk sent to the laboratory, suspected to be the cause of an infant's illness, was found to contain pus and streptococci. The source proved to be from the best sanitary nursery-milk dairy in that part of the state. A control sample was taken immediately from the nearest source, and the same findings were recorded. Because of the progressiveness of the producer, he was personally interviewed. The laboratory findings and their meaning were laughed at by the producer and his weekly bacterial count of the nursery milk, made by an authority, was shown the writer. This report had just come in that morning, and the count, standing at but a few thousand, bore with it the statement from the authority that it was the best count that he had ever made. After much discussion, the producer called up his manager, asking him to find out what had been done with a certain cow that had been ordered out of the herd because one teat had been bruised by being stepped on. The manager found that on the previous day a green hand had

included the milk from that particular cow with the market milk. A sample from that cow and one from the remainder of the herd confirmed the previous finding. The year following, while the same producer was away for some days, we found his nursery milk showing pus and streptococci. Before the next milking the infected cow was found by this method, and later the finding was confirmed by physical examination. This brings up two points that are important; first, that while a producer's milk supply may be officially shut out from the city because of the presence of pus and streptococci in his market milk, yet from the speed with which samples from animals suspected or known to be infected can be examined by the laboratory, the trouble can be rectified in time to allow the next milking to come into the city; second, that the producers have kept a much closer watch on even minor cow troubles, as shown by the frequency with which producers during the past two years have sent in samples from cows which have been isolated, either because of known trouble, or to find out if the trouble has entirely cleared up, or because the producer was suspicious of some trouble of which he could find no evidence on physical examination. We have been assured by several producers that the laboratory has proved to be a most valuable aid to them in protecting their milk supplies.

The percentages of contaminated and dirty milks that we have found the past four years are of interest:

1907, pus and streptococci	5. %	dirt, 37%
1908, " " "	2.5%	" 26%
1909, " " "	1.8%	" 23%
1910, " " "	.14%	" 12%

Following are the statistics of mortality from infantile diarrheal diseases:

Periods	Births	Deaths Under 1 Year	Deaths Under 5 Years
1887–1890	9,748	383 or 3.92%	465 or 4.84%
1891–1894	10,623	445 or 4.19%	526 or 5.46%
1895–1898	11,512	457 or 3.96%	581 or 5.04%
1899–1902	11,469	411 or 3.58%	524 or 4.56%
1903–1906	12,589	437 or 3.47%	522 or 4.14%
1907–1910	14,264	367 or 2.58%	426 or 2.98%

Put in another form, for the periods designated, these statistics show that there have died from infantile diarrheal diseases, respectively one out of every 25, 23, 25, 27, 28 and 39 children born. During the last period, which is that during which milk examinations have been made, the infantile mortality for the periods under 1 year and under 5 years of age from diarrheal

diseases, contrasted with five previous periods of similar duration, has been cut very nearly in halves. This, in the absence of any other apparent factors at work, we believe is the result of milk inspection, and the Stewart method of milk sediment examination. While we believe that the greatest factor in reducing infant mortality will be that of teaching the mothers to feed the babies rationally, yet we feel confident that the detection and the shutting out of all supplies which show infected milk is a factor of but little less value. The value of artificially soured milk for sick as well as for normal infants is well known, and we do not feel that plate counts discriminate between these and truly dirty milk as does the smear method.

193 York Street.

THE PURIFICATION OF WATER BY ANHYDROUS CHLORINE.

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In June, 1910, the writer began a series of experiments with the object of determining the availability of commercial liquefied chlorine for the purification of water. It is believed that the use of chlorine in the gaseous form and dry state had not been used or proposed for the purification of domestic water supplies before that time. Previously chlorine as a purifying agent had been added to the water as "chlorine water" or as a solution of one of the hypochlorites; dry gaseous chlorine had not been directly applied to the water to be purified.

It was recognized that if an apparatus could be devised for accurately dosing the water with the dry gas, the method would be much superior to those using hypochlorites or chlorine water, because of the uniform strength of the purified, dry, compressed gas. It is well known that the hypochlorites are unstable compounds and the content of "available chlorine" is uncertain. This necessitates frequent examinations in order to determine the quantity to be used. Another objection to the use of hypochlorites is that more or less troublesome dosing devices must be used. It has also been found that a slight excess of the hypochlorites imparts a disagreeable taste and unpleasant odor to the water.

At the present time chlorine is made in large quantities by the electrolysis of salt. In fact it is a by-product in the manufacture of caustic soda. Most of the chlorine so obtained is used to make calcium hypochlorite and other hypochlorites, but a considerable quantity is purified, dried, liquefied by pressure, and put on the market in steel drums or cylinders holding from 100 to 140 pounds each. This chlorine is almost chemically pure, containing nothing except traces of oxygen, carbon dioxide, and nitrogen. In putting up chlorine in this way all water vapor must be removed in order to prevent corrosion of the steel used in the construction of the storage drums. The pressure of this liquefied chlorine on the walls of the drum varies from 54 pounds per square inch at 32°F. to 216 pounds at 122°F.

The price of liquefied chlorine varies from fifteen to twelve cents per pound, depending on the quantity. I have been informed by producers, however, that it is probable, if the demand for it should grow, that the price would soon be much less than it is at present.

From the Chemical Laboratory, Army Medical School.

It may be well, before proceeding further, to briefly state certain properties of chlorine which have a direct bearing on its application as a purifying agent for water.

1. Chlorine is an elementary gas having a strong affinity for hydrogen.

2. It attacks metals, but (with some exceptions) only in the presence of water or other compound, from which, by appropriating hydrogen, it can liberate oxygen. This oxygen is the corroding agent. Hence *dry* chlorine can be kept in steel drums indefinitely and may be conducted through iron, brass, or copper pipes, and valves without undue corrosion, provided water and water vapor (moist air) are excluded therefrom.

3. Its sterilizing action, so far as water purification is concerned, is conceded to be due, not to the chlorine itself, but to the action of nascent oxygen, the result of the abstraction of hydrogen from some of the water molecules by the chlorine. This liberation of oxygen may be shown by the following equation, which, however, expresses only the final reaction and not the intermediate reactions which may take place as a result of the interaction of chlorine and water:

$$2\ Cl + H_2O = 2\ HCl + O.$$

The oxygen atom is most active immediately after it is liberated. If it does not soon find other suitable matter to combine with, it becomes joined to another free oxygen atom, the two forming a stable molecule. This can be demonstrated by conducting a little chlorine into a beaker of water and testing from time to time with iodized starch (starch paste and iodide of potassium). At first a blue color is developed, but as time elapses the test shows a fainter blue until finally no reaction is manifest. This is because the oxygen, at first nascent and capable of liberating the iodine, has resumed its normal condition. Bearing this fact in mind, it would appear reasonable to assume, therefore, that to obtain the maximum oxidizing effect of the chlorine it should be conducted, in its gaseous condition, directly to the water to be purified. This, however, has not been the usual practice either for chlorine or the hypochlorites. Chlorine in the past has been used as chlorine water, while the hypochlorites are first mixed with water and the resulting chlorinated water is then added in proper quantity to the water to be purified. When used in this way much of the oxidizing effect of the nascent oxygen is lost.

4. Water at ordinary temperature will absorb about two volumes of chlorine. This is equivalent to about 4000 parts per million by weight.

This ready solubility of chlorine is of great importance in water purification, since it makes it unnecessary to use the elaborate mixing devices which would be required were the chlorine not easily soluble in water.

QUANTITY OF CHLORINE REQUIRED FOR PURIFYING WATER.

In practice, the quantity of chlorine required depends entirely upon the amount of oxidizable impurities in the water. These oxidizable substances may be inorganic or organic; and the latter may be either living or dead.

Water of low organic content, as shown by its "oxygen consumed" value, will require less chlorine than water showing a higher value. This is also true of other processes based on oxidation, notably the hypochlorite process, and the ozone process.

In general, it may be said that with an average unfiltered river water such as that of the Potomac, about one-half of a part (by weight) of chlorine gas per million of water will be required. For clear lake waters three-tenths to four-tenths of a part per million will be sufficient. That is to say, it will require from three to four pounds of liquid chlorine for a million gallons of water of average purity.

CHANGES PRODUCED IN WATER BY CHLORINE USED AS A PURIFYING AGENT.

1. Chlorine reduces the quantity of the organic and other oxidizable substances contained in the water, or removes them entirely, as the diminished oxygen consuming value of the water shows.

2. By the interaction of chlorine and water a relatively minute quantity of hydrochloric acid is produced. The hydrochloric acid thus formed is neutralized by the carbonate of lime normally present in the water, forming chloride of lime at the expense of a small portion of the carbonate.

3. Oxygen is liberated. A part of this nascent oxygen combines with the oxidizable impurities of the water, while the rest resumes its normal state and either remains dissolved in the water or escapes.

4. Physical changes.

(*a*) *Taste.*—When used in proper quantity pure chlorine imparts no taste whatever to water purified by it. At least two parts of chlorine per million (four times the quantity necessary to sterilize) must be added before even the slightest change in taste can be distinguished in Potomac River water. It is probable however, that the disagreeable taste imparted to certain waters by chlorine or hypochlorites is due not to the chlorine *per se* but to the products formed by the oxidation of organic matter contained in the water.

(*b*) *Odor.*—The purified chlorine must be used in excess before it imparts an odor of chlorine to the water. Even when sufficient chlorine is used to impart a taste to the water the odor soon disappears and is at no time unpleasant.

It will thus be seen that the chemical composition and physical character of the water are practically unaffected by the use of chlorine, limited in quantity to a reasonable excess over that required for purification.

(*c*) *Length of Time of Contact.*—The experiments made in the chemical laboratory of the Army Medical School, indicate that the purifying action of dry chlorine gas, when applied to Potomac River water, is practically instantaneous. If particulate matter in which bacteria are imbedded is in the water, the action of the chlorine is not so rapid, time being required for it to penetrate the particles. Furthermore, certain bacteria, or rather spores, notably of *Bacillus subtilis*, resist the action of chlorine even in large amounts and after long contact. As much as six parts of chlorine per million will not destroy all spores of *Bacillus subtilis*, when that organism is present in large numbers.

As the time required to kill the pathogenic bacteria is so brief, no provision is made for prolonged contact in the apparatus presently to be described. The water merely flows through it, absorbing chlorine in its passage, and may be used immediately on discharge.

SUPERIORITY OF LIQUEFIED CHLORINE AS A PURIFYING AGENT FOR WATER.

1. It is superior to hypochlorites in the following respects:

(a) It is of uniform composition and may be supplied by a simple apparatus, to the water in unvarying, predetermined quantity, adjusted to the requirements of the water under treatment. Hypochlorites rapidly deteriorate when exposed to moist air and must be tested frequently. Furthermore, it is difficult to adjust the quantity with certainty.

(b) Liquefied chlorine gas used in proper quantity imparts neither taste nor odor to the water, while a slight excess of the hypochlorites makes the water unfit for domestic use.

2. It is superior to ozone because:

(a) It is much cheaper.

(b) It is easier to apply chlorine than ozone. Chlorine, because of its great affinity for, and solubility in, water requires no elaborate and complicated mixing apparatus; mere contact over a comparatively small surface of the flowing water is sufficient. The water in its passage absorbs the gas and is further mixed in its onward flow through the pipe, conduit, or aqueduct.

DESCRIPTION OF CHLORINE WATER PURIFYING APPARATUS.

The apparatus described below was developed as a result of much experimentation and is believed to satisfactorily solve the problem of purification of water by chlorine gas. It consists of the following parts:

1. A pressure-reducing mechanism for reducing the high pressure of the compressed chlorine to a uniform low pressure, so that it may be possible to supply it to the water in uniform quantity.

2. A current reducing and regulating device placed between the pressure-reducing mechanism and the mixing chamber.

3. A mixing or absorbing chamber into which the chlorine is conducted, and through which the water to be purified flows.

4. A mechanism which automatically starts the flow of gas into the mixing chamber when the water is turned on and arrests the flow of gas when the water is turned off.

Referring to the diagram (page 788), 1 represents a tank, reservoir, standpipe, or other container in which a fairly constant water level is maintained.

The pipe 2 with a valve 3 leads from the reservoir and is continuous with another pipe 5 having a water-seal at 6 and a valve at 4. In operation the valve 3 is set so that it will deliver less water than pipe 5 and valve 4 are capable of conducting, so that pipe 5 is only partially filled with water. This pipe 5 constitutes the absorbing chamber into which the chlorine is conducted through the tube 36.

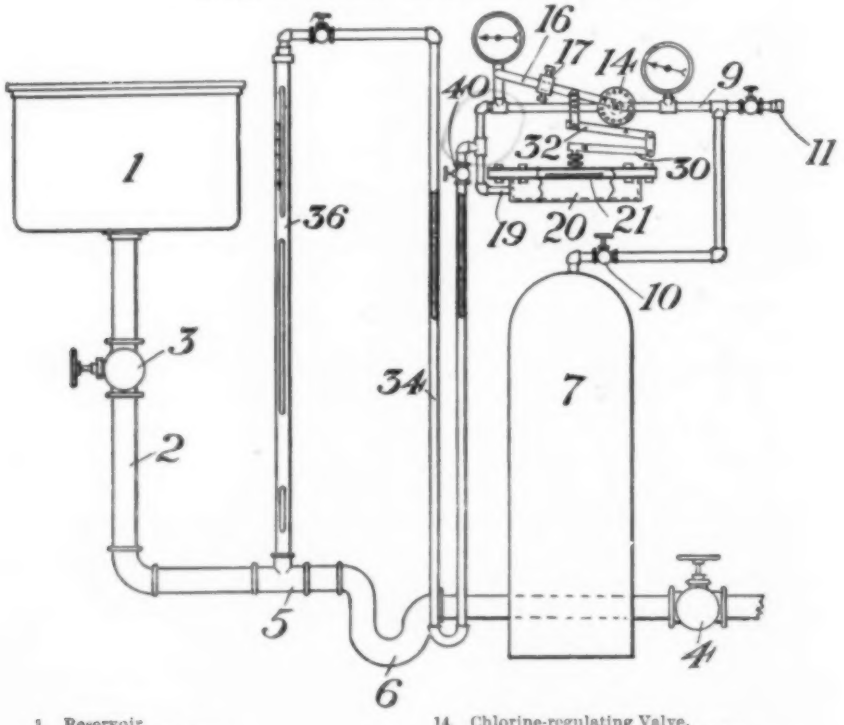
A drum 7 contains the compressed chlorine, and at 11 is shown a connection for attaching another drum, if it is desired to do so. A metallic gas receiver 20 is connected with the drum or drums by the pipes 9 and 19. The top of this receiver is a thin metallic sheet 21, to which is attached a set of multiplying or amplifying levers 30, 32, 16. One end of the lever 16 is attached to the stem of the valve 14, while the other end is provided with a movable weight 17.

At 40 in the chlorine pipe is shown another valve. In a large apparatus in which much chlorine is used the amount may be regulated by this valve, but where the quantity of chlorine required is small, say sufficient for an apparatus with a capacity of only 40,000 gallons of water per hour or less, it is better to employ some device less likely to be plugged up by dust, rust, etc., than would be the valve with such a minute opening. This is done by opening valve 40 to its limit and interposing resistance in the "U" tube 34 by partly filling it with sand, powdered glass, or other material not acted on by chlorine. The resistance can be changed by using material of suitable size and varying the depth of it in the tube. From the tube 34 the chlorine passes through tube 36 into the absorbing or mixing chamber 5.

OPERATION.

When valve 10 of the chlorine drum is opened, chlorine passes through tube 9 and valve 14 into pipe 19, gas receiver 20, and resistance tube 34. Because of the resistance offered by the sand in the tube, the pressure in the receiver 20 rises and lifts the diaphragm 21, and the levers operated by it, and closes valve 14. As the gas passes through the sand in tube 34 the pressure in chamber 20 falls and the levers descend, opening valve 14, thus permitting more gas to pass.

CHLORINE WATER PURIFYING APPARATUS.



1. Reservoir.
2. Water Supply Pipe.
3. Water-regulating Valve.
4. Discharge Valve of Mixer.
5. Mixing Chamber.
6. Water Seal.
7. Chlorine Drum.
9-19. Chlorine Pipe.
10. Chlorine Drum Valve.
11. Connection for Another Drum.
14. Chlorine-regulating Valve.
16. Lever Attached to Chlorine Valve.
17. Weight to Regulate Working Pressure of Chlorine.
20. Metallic Chlorine Receiver.
21. Metallic Diaphragm.
30-32. Amplifying Levers.
34. Resistance Tube.
36. Chlorine Supply Pipe.
40. Valve.

Valve 4 in the main 5 being open, the water will flow through the mixing chamber 5, and as it comes into contact with the chlorine will absorb it. The chlorine and water are further mixed in their passage through

water seal 6 and the main beyond. The purified water is discharged through valve 4. The quantity of chlorine going to the water may be regulated by shifting the weight 17 on the lever 16.

Once adjusted, the quantity of chlorine delivered by the apparatus in a given time will be constant, for it flows under a constant uniform pressure. The quantity of water flowing through the mixing chamber 5 will also be constant for a given time, since it is under a constant head. Therefore, by adjusting the flow of chlorine to the flow of water, a practically uniform mixture of the two may be attained.

It may be stated here, that in practice the quantity of chlorine necessary to purify a water is determined by testing the flow from valve 4 with a mixture of starch paste and iodide of potassium. The apparatus should be so adjusted that the water shows a sky blue color when it flows into a white dish or cup containing a few drops of the test mixture.

Automatic Chlorine Cut-off.—If valve 4 be closed, the flow of water in pipe 5 will be arrested, and the back pressure will cause it to rise in pipe 36 and stop the flow of chlorine. When valve 4 is opened the water in pipe 36 will flow out and the supply of chlorine will be re-established.

Of course this form of apparatus is only one of several that may be used; it is described here merely to illustrate the application of the process of purifying water by chlorine.

DATA RELATING TO THE PRACTICAL APPLICATION OF THE CHLORINE METHOD.

There is now in the Chemical Laboratory of the Army Medical School a small apparatus constructed on the lines shown in the diagram. This apparatus has a capacity of about 800 gallons per hour, occupies very little space, and weighs less than 200 pounds. The chlorine feeding and regulating mechanism of this small apparatus, with a few minor alterations, is large enough to supply chlorine for a mixer having a capacity of 1,000,000 gallons per hour. This particular apparatus has been in use now for more than six months and has given no trouble whatever. The process is believed to be applicable for use in purifying water supplies for cities, towns, factories, hospitals, etc.

1. Cost of installation of plant.

For cities already having aqueducts, reservoirs, pumping machinery, etc., this item would be very small. The mixing chambers, may be constructed of concrete, iron, terra cotta, or other suitable material. In some cases it may be feasible to utilize an aqueduct itself as a mixing chamber.

It may be well to state here that a mixing chamber sixteen inches in diameter and twenty-four feet long has a capacity of 750,000 gallons per day, while one thirty-two inches in diameter and fifty feet long has a

capacity of 3,000,000 gallons. In order to convey an idea of the size of plant necessary, it may be said that to purify 750,000,000 of gallons per day (the quantity furnished greater New York), sixteen mixing chambers ten feet in diameter and two hundred feet long would be required. These would occupy about one acre of ground.

2. Cost of labor.

The item for extra labor would be trifling in amount for small or large plants. In the former all labor could be performed by the men operating the pumping machinery already in use; while in very large plants only one mechanic to look after the chlorine feeding apparatus, and a man or two to change the chlorine drums as they become exhausted, would be necessary.

A one hundred and forty pound drum of chlorine is sufficient for, say, 35 to 45 million gallons of water; therefore, by using a number of drums simultaneously frequent changes would not be necessary.

3. Cost of chlorine.

This will range from about thirty-six cents to fifty cents per million gallons of water treated, depending of course upon the quantity of chlorine used. As stated elsewhere in this paper, chlorine costs about twelve cents per pound and waters containing only a moderate amount of oxidizable impurities will require from three to four pounds per million gallons.

EFFICIENCY OF THE METHOD.

A working model of the apparatus with a capacity of 500 gallons per hour having been constructed, the writer, early in January, 1911, reported to the Surgeon General of the Army the results of the experiments made with chlorine and requested that the method be examined to determine its availability for use in the military service.

By order of the Secretary of War, this investigation was undertaken by a board of officers appointed in 1909 to investigate and make recommendations in regard to water supply and sewage disposal for permanent military posts, etc. The investigations of this board began early in February and continued until May, the report of the results being made by the board June 1, 1911.

The first series of efficiency tests was made at the pumping station at Fort Myer, Va. As stated by the board in its report: "The Board determined that in order to procure a typical water for experimentation which was somewhat polluted and had not been purified by filtration, the apparatus should be installed at the pump house of the intake of the Fort Myer water supply." The apparatus was accordingly set up by the side of the mechanical filter and operated continuously (day and night) for two weeks.

Table No. 1 shows the results of this series of tests:

TABLE I.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 1)

These tests were made at the pumping station at Fort Myer, Va. The water supplied to the chlorine apparatus had been treated with alum and contained much particulate matter and was turbid, at times quite muddy.

No. of Sample	Date of Collection and Examination, 1911	Tubes containing gas after Incubating 48 Hours			Number of Colonies after 48 Hours			Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?
		River Water	Water from Mechanical Filter	Water from Cl. Apparatus	River Water	Water from Mechanical Filter	Water from Cl. Apparatus		
1	Feb. 10	50	20	0	1000	300	90	.80	No
2	Feb. 11	50	10	10	170	45	60	1.20	No
3	Feb. 13	0	0	0	160	40	70	6.10	Yes
4	Feb. 14	10	0	0	400	130	75	.50	No
5	Feb. 15	20	0	10	3000	80	50	.50	No
6	Feb. 16	40	0	0	3000	95	75	.50	No
7	Feb. 17	90	0	10	500	0	140	1.00	No
8	Feb. 18	80	20	0	5000	100	100	.75	No
9	Feb. 20	70	0	10	3000	32	46	1.16	No
10	Feb. 21	40	20	10	800	75	60	.70	No
11	Feb. 23	20	10	0	500	175	200	.80	No
12	Feb. 24	10	0	10	1300	100	100	.80	No
Average,		40%	6.6%	5%	1569	97	88		

As stated by the board, "The fact that this water had been treated with alum, operated somewhat to the disadvantage of a chemical sterilizing process, because the particles of sediment, when coagulated by the alum, protected the bacteria contained within the particles to a certain extent from the action of the ozone (nascent oxygen). As will be seen, however, from Table I (Series No. 1), the chlorine apparatus showed a greater reduction of gas-producing and other bacteria than did the very excellent mechanical filter in use for the Fort Myer water supply. The organisms not destroyed were harmless saprophytes, principally spore bearing bacilli (*bacillus subtilis*), which can only be destroyed by prolonged boiling. The bacteriological tests of the water from the apparatus were made in the bacteriological laboratory of the Army Medical School, under the direction of a member of the board, who is chief of the laboratory."

It will be noted that the amount of chlorine used in this series of tests varied from 0.5 of a part to 6.1 parts per million, as determined by titration, and that only in test No. 3, did the water have a taste or odor of chlorine. In this case the excess of chlorine was used in order to see if it were possible to produce absolute sterility. As a matter of fact the result was no better than in numbers 4, 5, and 6,—in which only one-half of a part of chlorine per million was used.

The great variation in bacterial content exhibited by the raw water was due no doubt to the influence of the tide and condition of the river.

TABLE II.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 2)

The raw water was a mixture of eight parts tap water and one part of river water, obtained near the mouth of a sewer. It contained considerable particulate matter and was quite muddy. Rate of flow through apparatus, 430 gallons per hour.

No. of Sample	Date of Collection and Examination 1911	Percentage of Tubes Containing Gas After 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus		
1	March 4	100	0	1100	100	1.00	No
2	March 5	100	10	2500	64	.75	No
3	March 6	100	0	1800	45	.50	No
4	March 7	100	10	2000	98	.50	No
5	March 8	100	0	700	70	.50	No
6	March 9	100	0	700	60	.50	No
7	March 10	100	0	900	80	.40	No
8	March 11	100	0	875	90	.50	No
9	April 3	100	10	500	45	.50	No
10	April 4	100	0	300	75	.50	No
Average.		100%	3%	1137	73		

Again it will be observed that 0.5 of a part of chlorine per million was quite as effective as larger quantities. The surviving bacteria, as in series No. 1, were chiefly *bacillus subtilis*.

TABLE III.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 3)

The raw water was a mixture of two parts of tap water and one part of river water from near the mouth of a sewer. Considerable particulate matter was present and the water was quite muddy.

Rate of flow through appratus, 430 gallons per hour.

No. of Sample	Date of Collection and Examination 1911	Percentage of Tubes Containing Gas After 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus		
1	April 5	100	10	3500	60	.50	No
2	April 6	100	20	1200	50	.50	No
3	April 7	100	20	5000	45	.50	No
4	April 8	100	10	3500	50	.50	No
5	April 10	100	20	2000	100	.50	No
Average,		100%	16%	3040	61		

This series is of interest in that it shows the influence of an excess of organic matter. The raw water contained, presumably, three times as much organic matter and bacteria, as that used in series No. 2. It was muddy and had an offensive odor.

The quantity of chlorine used was one-half of a part per million, which was not enough, for while the bacterial content was reduced to a satisfactory point as shown by the colony count, sixteen per cent. of the tubes showed the presence of the colon bacillus.

The series of tests shown in Table IV, were made in order to determine the efficiency of the method in destroying the colon bacillus in the absence of particulate matter. It will be observed that under the conditions stated four-tenths of a part of chlorine per million was effective although considerable *dissolved* organic matter was present in the water.

TABLE IV.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 4)

The raw water used for this series of tests was made by contaminating tap water with the filtrate from fresh horse manure; 2-10 cc. of filtrate being added to each gallon.

Rate of flow through apparatus, 430 gallons per hour.

No. of Sample	Date of Examination	Percentage of Tubes Containing Gas After Incubating 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?	Remarks
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus			
1	April 13	100	0	1200	50	.40	No	This water contained no particulate matter. The bacteria not destroyed were spore formers chiefly *bacillus subtilus*. Considerable organic matter present in the raw water.
2	April 14	100	0	1200	50	.40	No	
3	April 15	30	0	300	60	.40	No	
4	April 17	20	0	400	50	.40	No	
5	April 18	100	0	300	25	.40	No	
6	April 21	100	0	3000	50	.40	No	
7	April 22	0	0	1200	80	.40	No	
8	April 24	10	0	600	70	.40	No	
Average,		57.5%	0%	1025	55			

TABLE V.

RESULT OF EXAMINATION OF WATER FROM CHLORINE PURIFYING APPARATUS.

(Series No. 5)

Raw water consisted of a mixture of four parts of tap water and one part of river water, obtained from the Potomac River below the mouths of sewers. At times it was very turbid and contained much particulate matter. It was strained through cloth to remove the larger particles.

Rate of flow through apparatus, 430 gallons per hour.

No. of Sample	Date of Examination	Percentage of Tubes Containing Gas After Incubating 48 Hours		Number of Colonies After 48 Hours		Cl. Used Parts per 1,000,000	Taste or Odor of Chlorine?	Remarks
		Raw Water	Water from Cl. Apparatus	Raw Water	Water from Cl. Apparatus			
1	April 25	90	0	3500	160	.40	No	
2	April 26	30	0	4000	110	.40	No	
3	April 27	100	20	1000	80	.40	No	Water very muddy.
4	April 28	50	0	1500	70	.40	No	The organisms surviving were chiefly *bacillus subtilis*.
5	April 29	100	0	6000	60	.40	No	
6	May 1	10	0	2000	20	.40	No	
7	May 2	80	0	2800	85	.40	No	The variations in the raw water were probably due to the tide and state of river.
8	May 3	0	0	5000	60	.40	No	
9	May 4	0	0	2500	100	.40	No	
10	May 5	0	0	1200	90	.40	No	
11	May 6	10	0	1100	150	.40	No	
Average,		42.7%	1.8%	2781	99			

In the first series of tests, made at Fort Myer, the water used was from the pump supplying the mechanical filter. The alum solution used was fed into this pump, and together with the finely divided clay in the water, formed flocculi in which many of the bacteria were imbedded, and were thereby protected from the action of the chlorine. This is believed to account for the presence of the colon bacillus in about five per cent. of the tubes in that series, although more chlorine was used than in series No. 4 in which all the *B. coli* were destroyed.

In the series of tests shown in Table V (page 795), the water was turbid, having in suspension much finely divided clay. It also contained many rather coarse particles which were removed by straining the water through a cloth. Four-tenths of a part of chlorine was used with the result shown in the table.

Having concluded its investigation of the method, the board referred to above summarized its findings and recommendations; from that summary the following extracts are quoted:

"It is the conclusion of the Board that this apparatus offers the following advantages over other methods of water purification now in use:

"(1) EFFICIENCY.—It is believed that the apparatus (method) is as efficient as purification by ozone or by hypochlorite and is more reliable in operation than either.

"(2) COST OF INSTALLATION.—The apparatus is exceedingly simple and could be installed in connection with any water supply where the water is pumped into a tank or storage reservoir, at very small cost. * * * * * *

"(3) COST OF OPERATION.— * * * * * *

The cost of attendance would be very slight, as the apparatus is automatic and only requires the attachment of a new cylinder at infrequent intervals when the supply of chlorine becomes exhausted. * * * * * * *,"

"In view of the advantages which this apparatus is believed by the Board to possess over those now on the market, it is recommended that such an apparatus be installed * * * * at some post where the water is polluted and where no satisfactory system of purification has been installed."

COMPARISON WITH OTHER PURIFICATION METHODS.

In conclusion it may be well to compare this method with other well known means of water purification:

Anhydrous Chlorine and Ozone.

1. The efficiency is practically the same in the two processes.

2. The chlorine apparatus is much more simple and requires no delicate electrical machinery and no complicated mixing apparatus, such as is necessary with ozone.

3. The chlorine method is more reliable in operation and requires less labor.

4. It is also cheaper, costing less than fifty cents per 1,000,000 gallons for chlorine.

5. The chlorine method is applicable to plants of large size, which is not true in the case of ozone as applied at the present time.

Chlorine and Hypochlorites.

1. It is easier to regulate and adjust the quantity of chlorine than it is to regulate the quantity of hypochlorites. The gas is of constant composition, and under a given pressure a definite quantity will always pass through a given orifice in a unit of time, so when once adjusted to the flow of water no further regulation is required.

Hypochlorites, on the contrary, are variable in strength, change rapidly when exposed to air, and require constant care in order to properly regulate the quantity.

2. The chlorine method, the apparatus used being automatic, requires less labor than does the hypochlorite.

3. Since it is easier to regulate the quantity of chlorine than it is to regulate the quantity of hypochlorites, a disagreeable taste and an unpleasant odor are less likely to be imparted to the water when the former is used. It is probable that in this respect the superiority of chlorine is due, in part at least, to the fact that the liquid chlorine has been purified, while the hypochlorite has not.

4. At the present time the hypochlorites cost considerably less than does chlorine, about one-fourth in fact; but if the cost of the extra labor required in the hypochlorite process, and the waste during manipulation be considered, the difference in cost is not so great. Furthermore, it must be remembered that there has heretofore been very little demand for liquid chlorine, and consequently its manufacture has been limited. It is probable that if it were made on a large scale the price would be very much less than it is at present.

Chlorine and filtration.

1. Chlorine is more efficient than filtration in eliminating pathogenic organisms.

2. It is cheaper to install a chlorine purifying plant than a filter plant.

3. A chlorine plant is cheaper to operate because the labor required is so much less.

4. In the chlorine method no provision is made for clarifying the water, hence, for plants other than those drawing their supply from lakes or wells, it will usually be necessary to have sedimenting reservoirs or rough filters to clarify the water either before or after the application of the chlorine.

American Public Health Association

A REVIEW OF PRACTICAL METHODS FOR SUPERVISING THE MILK SUPPLY OF CITIES.

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Although the views of individual communities on the administrative control of the milk supply have been frequently described by various authors, yet a general consideration of this matter may be of interest to the sanitarian.

With the view of correlating the various methods used throughout the country for the supervision and control of the milk supply of cities and towns, and of comparing the results obtained by the use of certain general and accepted methods, lists of questions were sent out during the summer of 1909 to a number of the more important cities and towns. The replies to these questions, and a study of the ordinances, literature, and forms furnished by the health authorities addressed, form the basis of this paper. The questions and replies are given in tabulated form, and a discussion of the various methods in general use, or of a desirable character, will be taken up under their respective heads.

PERMITS.

Ninety-four per cent. of the cities represented require permits or licenses to be obtained for the sale of milk and cream. The advantage of this requirement is at least two-fold, for it provides for a list of all persons selling milk, and furnishes an effective means of compelling milk dealers to comply with the sanitary ordinances and regulations, a violation of which should cause the permit to be temporarily suspended or to be revoked. The inspectors should be empowered by regulation to temporarily prohibit the sale of milk on account of insanitary conditions of a dairy or store. Some cities have such a regulation, limiting the time for which an inspector may prohibit the sale of milk to forty-eight hours, and providing a penalty for the wilful or malicious suspension of the sale of milk without probable cause. The permits should, of course, be non-transferable and void for the sale of milk at another address than that for which it is issued.

The forms which the applicant for a permit must fill out vary considerably in the different cities, for their character is determined by local conditions. Some applications provide for a detailed description of the

surroundings of the dairy and the conditions under which the milk is produced and handled. For the registration of producers shipping milk to the city this seems advisable, especially if there be no means at hand for inspecting the dairy farms, but for the local dairies and stores it probably is better to have this data collected by the inspectors, and to limit the information required of the applicants to as simple terms as possible. He should give the names and addresses of all persons from whom milk is secured, with the station or place at which the milk is obtained, the names and addresses of all persons engaged in the handling of the milk, the average number of gallons sold daily, both in bulk and in bottles, the average number of customers served daily, and the number of vehicles used in the distribution of milk.

METHODS OF KEEPING RECORDS.

Perhaps the most convenient method of keeping all records is by the use of index cards. List of persons selling milk should be kept by name, by address, by permit number, and in the case of a dairy by the trade name.

In Baltimore, where there are about thirty-five hundred places where milk is sold, it has been found convenient to divide the city off into districts. A large map of the city, showing all streets with the numbers of the blocks, was secured, and into it were stuck tacks representing all places where milk was sold. Districts were then plotted so as to contain from fifteen to twenty-five dairies and stores, rubber bands being used to mark the boundaries of the districts. After the milk ordinances had been in effect for a year or so, it was found that the number of places in a district remained fairly constant; the tacks were then dispensed with, and the boundaries ruled off with ink on a new map. The district number of a dairy or store is recorded on all cards relating to that place. All of the dairies and stores in a district are written on a card, and the streets bounding the district are written on the reverse side. Every day, after the work of inspecting milk at the railroad stations has been completed, each inspector is given a district card and required to visit and inspect all places in his district where milk is sold. If he should find a place where milk is sold that is not on his district card, or if he should find that an address on his card is not within the boundaries of the district, he notes the facts, and corrections are made accordingly. He also reports all persons who may have moved or discontinued the sale of milk, and their cards and reports are withdrawn from the regular files, except the permit number cards, which are kept on file unless the permits were returned, in which case the numbers are used again when issuing other permits. If a person should report to the inspector later that he no longer sells milk or cream, and yet should retain the permit

and should resume the sale of milk, (which seldom happens), he is sure to be added again to the lists by the next inspector, because he visits all places within his district. All places are inspected on an average of every six weeks, and no inspector is re-assigned to a district until he has had every one of the other one hundred and seventy districts in the city.

The sanitary condition of dairies and stores is best recorded by means of the score card system, whereby a dairy receives a certain mark according to its points of merit, one hundred for perfection being used as a basis for scoring.

Of the cities replying to the questions, sixty-three per cent. use score cards for dairy farms, thirty-five per cent. use them for local dairy depots and stores, and thirty per cent. use them for all inspections. Two cities use them for local dairies but not for stores, and one city uses them for stores but not for dairies.

The score card probably was first introduced by Dr. William C. Woodward, health officer of the District of Columbia, January 9, 1904. Professor R. A. Pearson presented a somewhat different form of score card February 25, 1905. Later, the Bureau of Animal Industry, Dairy Division, of the U. S. Department of Agriculture, after a thorough investigation of the merits of the score card system, prepared a score card July 1, 1906, and it is due to the efforts of this bureau that the score card is so widely used. Probably the best score card is the one adopted at the last meeting of the Official Dairy Instructors' Association. This card is self explanatory, is applicable to all sections of the country, and its adoption by all dairy inspectors would effect the much desired uniformity in scoring by this method. The fact that the average score attained in different cities varies from 41.1 per cent. to 95.0 per cent. indicates either that there is a wide range in the sanitary requirements of the cities represented, or that uniformity in scoring by this method is deplorably lacking. Score cards and reports may be filed conveniently by numbers, the numbers being written on the name and street cards. This keeps all reports on a particular place together, and the name cards may be conveniently consulted for all information other than the sanitary condition of a dairy or store.

COLLECTING SAMPLES AND RECORDING RESULTS.

Samples for chemical analysis may be collected conveniently in cork stoppered bottles holding about 60 cc. Except in rare cases, this amount of milk is sufficient for the routine examinations. The bottles either should be numbered or have identification tags attached. A good plan is to have metal number tags wired to the necks of the bottles; these tags can be removed in case the bottles break.

The inspector, when collecting a sample, fills out a card with all necessary data, including the temperature and specific gravity of the milk, the place and time at which the sample is taken, and the number of the bottle containing the sample. These cards have spaces for entering the results of the analysis, and after this is completed, the cards may be filed for reference without further clerical work. With sets of guide cards containing a list of the names of milk shippers and a list of the names of local dairymen, all of the analysis cards of one person may be filed together. A convenient size of sample card measures three and one-half by six inches, and of guide card four by six inches.

Samples for bacteriological examination should be taken in glass stoppered bottles. An arrangement proposed by Dr. Wm. Bissell, of Buffalo, and somewhat modified by the writer, has been satisfactorily used in Baltimore for some time in collecting these samples. A light copper wire about thirty inches long is fastened to the stopper and neck of the bottle and wound in an even coil around the neck. Sheets of ordinary white letter paper, measuring about nine by twelve inches, are cut in halves to form pieces about nine by six inches. One piece of paper is wrapped around the lower part of a bottle so as to reach to the shoulder. Another piece is wrapped around the remaining part so that all of the bottle is protected. The bottles are then sterilized at one hundred and forty degrees (centigrade) for one hour. In collecting the samples the cans are well shaken to mix the cream and milk as thoroughly as possible. The top outer wrapper of a bottle is slid off, the stopper removed, the bottle withdrawn by the wire from the remaining wrapper, and immersed into the milk without having come in contact with anything outside of the paper wrappers. Samples taken in this manner are a little high in butter fat, and therefore cannot be used for chemical examination.

In an effort to improve the quality of the market milk of Baltimore, a number of schemes have been tried, some of which will be briefly described. When a sample of milk, obtained at a railroad station, is found to be below the legal requirement in butter fat, the shipper is notified that unless he raises the butter fat content of the milk to at least three and one-half per cent., the legal standard, the person to whom it is consigned will be notified of its poor quality. Provision is made to secure additional samples of the milk from the same shipper a week or so later, and if they, or any other samples from that shipper, are again below grade, the consignee is notified, and advised that if he should offer for sale milk of this quality he would be liable to prosecution. When a sample of milk shows a high bacterial count, an excessive number of streptococci and pus cells, or the presence of the colon bacillus, the producer is notified, an explanation of the

terms used, together with a brief outline of principles to be observed to correct the matter, being embodied in the notice. Additional samples are obtained from the same shippers whose milk showed a bad record, and the various data collected in this manner will be used in efforts to secure additional legislation and more adequate means for the supervision of the dairy farms. Especially is it desirable to establish a maximum bacterial standard. The data at hand from the various cities show that about forty-three per cent. have ordinances or regulations providing for a maximum permissible bacterial count. Nine per cent. have a standard of 100,000; two per cent. have one of 300,000; two per cent. one of 400,000; and twenty-six per cent. one of 500,000 bacteria per cc.

When a sample of milk obtained from a local dealer is found to run low in butter fat, that dealer is notified by registered mail of the results of the analysis, and advised that unless he should improve the quality of the milk he offers for sale to such a degree that it contains at least three and one-half per cent. butter fat, he will be prosecuted. He is also informed that to assist him to correct the matter, analyses will be made of any samples he may care to bring to the department of health. A copy of the letter is kept on file for use as evidence in court to show that he had been previously warned of a violation of the law. At first, notices were sent out by ordinary mail, but they were seldom effective. Since we commenced registering these notices, the dairymen have almost invariably replied to them in person. This gives an opportunity to interview them and to secure their coöperation, which is one of the most effective aids in governing the situation. We also make it a point to secure samples at the railroad stations from all the shippers of a local dairyman whose milk may have been found below standard. If his milk continues below grade after he has been notified and advised which of his shippers may be furnishing him with poor milk, he is prosecuted without further notice, unless he may have changed his shippers or, in good faith, made other efforts to comply with the law.

METHODS OF TRANSPORTING AND DELIVERING MILK.

When milk is not bottled at the dairy farms, it should be shipped in large, substantially made and well-tinned cans. These cans should have a wide mouth so that they may be readily cleaned, and should have all seams well flooded with solder. The use of wooden plugs for tops, or the use of paper and rags to secure the tops, should be prohibited. The local dairymen should be compelled to rinse or cleanse the cans before returning them to the shippers.

Since the delivery of milk and cream in bulk exposes them to contamination by street dust it is better to deliver them in bottles, provided the bottles are properly washed and sterilized before being refilled. On the other hand, unless the sterilization of all bottles is compelled by regulation, and the regulation adequately enforced, and unless the return of bottles from houses where there are cases of communicable disease is prohibited, this method of handling milk and cream may frequently spread disease. When milk is delivered from wagons, the measures and dippers should be kept protected from street dust when not in actual use.

COMMUNICABLE DISEASES.

Local Cases—Eighty per cent. of the cities prohibit the sale of milk from dairies or stores upon the premises of which there exists a case of certain of the communicable diseases; six per cent. do not, and six per cent. did not answer the question. The principal diseases for which the sale of milk is suspended, are typhoid fever, scarlet fever, diphtheria and tuberculosis. That no one coming in contact with a case of any of these diseases should be permitted to sell or handle milk is unquestionable, and the only certain means of preventing this is to either prohibit the sale of milk from the infected premises or to remove the patient suffering with the disease. Most cities possessing milk ordinances require milk dealers and producers to report cases of communicable disease on their premises; but it has been our experience that such cases are seldom reported, and that when legal proceedings are instituted against a violator of this requirement, the charge is generally dismissed on the plea of the defendant that he had not been definitely informed of the character of the disease. The best plan is to consult the records of cases reported by physicians to the board of health, and to compare them with the street list of persons engaged in the handling of milk, and with a list of the persons employed in handling milk for the larger dairies.

Cases on Dairy Farms—Cases of infectious disease throughout the state are reported to the state board of health. A list of these cases should be obtained from the department and compared with a list of the persons shipping milk to the city. This is only partly satisfactory because some district health officers report such cases only about once a month. Another plan is to secure each day a list of the positive specimens of throat cultures, sputum, and Widal tests and use them in locating cases of diphtheria, tuberculosis and typhoid fever.

DISEASE IN HOUSES WHERE MILK IS DELIVERED IN BOTTLES.

Where there are health wardens who investigate cases of communicable disease, they report the dairymen who serve milk to infected families.

These dairymen should be notified not to remove any bottles from infected houses until all danger of spreading disease by doing so is over. The report of the attending physician, or the removal of the placard in posted cases indicates that bottles may be taken away.

The danger of the spread of disease through the agency of infected milk bottles is well recognized. Even when bottles are sterilized before being refilled, there is still some danger that they may be infected before reaching the milk consumer if the removal of milk bottles from premises harboring cases of diphtheria, typhoid fever, scarlet fever and tuberculosis, is not prohibited; for in the course of handling such bottles the fingers of the driver may become infected and may transfer the germs of any of these diseases to the full bottles as he carries them about. All milk bottles should, of course, be sterilized, for there undoubtedly occur many mild or atypical cases of disease which are never reported to the department of health. Despite the evident danger of the spread of disease in this manner, very few cities have ordinances prohibiting the removal of bottles from infected houses.

In connection with the dispatch of notices to the dairies, informing them of cases of communicable disease on their routes, there should be kept a list of these residences with the dates when the cases were reported. When the number of cases of certain diseases on a particular dairy route in a given time exceeds an established maximum, which can be set from a knowledge of the number of customers served, suspicion of a milk epidemic may be aroused. Unfortunately, the information derived in this manner is obtained almost too late to be of much value, but it is at least worthy of consideration. Since the beginning of the use of this record in Baltimore, about two years ago, several milk epidemics have been discovered in this manner.

BOVINE TUBERCULOSIS.

Thirty-five per cent. of the cities require cows to be tuberculin tested, and fifty-five per cent. do not; one city expects to require this test, one city requires that the milk either be procured from tested cows or be pasteurized, and four cities did not answer the question.

In the light of recent knowledge it seems unnecessary to dwell upon the necessity of immediate and unceasing efforts to exclude tuberculosis infected milk from the public supply. This will only be accomplished by the elimination of all tuberculous cattle from the herds or by the pasteurization of all milk from untested cows.

SUPERVISION OF DAIRY FARMS.

Eighty per cent. of the cities have supervision of the dairy farms, seventeen per cent. have not, one city has a supervision within a radius of half a mile from the city limits, and one city did not answer the question. It is probable that in many cases the supervision of the dairy farms is provided for in an ordinance requiring that the milk be produced under sanitary conditions, the authorities assuming the right to examine the sources of supply where insanitary conditions are suspected.

THE USE OF REFRIGERATOR CARS FOR THE TRANSPORTATION OF MILK.

About thirty per cent. of the cities receive milk in refrigerator cars, fifty per cent. do not, and twenty per cent. did not answer the question. Under proper conditions, the use of refrigerator cars is, of course, desirable.

A special investigation of the conditions under which milk is hauled to Baltimore was undertaken last summer. Temperatures of seventy-nine shipments of milk were taken as soon as the milk was loaded on the cars, and again when the train had reached the city. No means of cooling the cars or the milk was provided, and the temperature of the cars ranged from sixty-nine to seventy-one degrees Fahrenheit. The time occupied in bringing milk from the farthest shipping station was two hours and fifteen minutes. A summary of the results follows:

	Railroad A	Railroad B	Railroad C
Temperature of car	71°	70°–71°	69°–71°
Time of first temperature	6:25 A. M.	6:30 A. M.	6:45 A. M.
Time of final temperature	8:40–9:00	8:45–9:00	8:10–8:25
Average initial temperature	64.7°	59.6°	62.2°
Average final temperature	66.5°	62.8°	64.1°
Average rise in temperature	1.8°	3.9°	2.4°
Maximum initial temperature	86.5°	75.2°	77.0°
Maximum final temperature	82.5°	73.0°	76.0°
Minimum initial temperature	46.0°	44.7°	58.0°
Minimum final temperature	54.5°	52.0°	61.0°
Maximum rise in temperature	8.5°	7.3°	4.0°
Minimum rise in temperature	—4.0°	—2.2°	—5.0°

The shipments showing the maximum initial temperatures had also the maximum final temperatures, as would be expected, and showed the minimum rise in temperature, this being in each case a negative quantity, i. e., the milk became cooler, since the original temperature was higher than that of the car and of the surrounding cans. Likewise, the shipments showing the minimum initial temperatures had also the minimum final temperatures, and showed the maximum rise in temperature.

Population. Over—	Supervision of dairy farms	Tuberculin test required	Score cards used for dairy farms	Score cards used for dairy depots and stores	Permits required for sale of milk	Daily consumption of milk and cream in gallons	Dairy depots where milk and cream are sold	Stores where milk and cream are sold	How often dairies and stores are inspected	Average score attained	Sale of milk prohibited on account of a case of communicable disease	Minimum butter fat standard for milk	Minimum butter fat standard for cream	Refrigerator cars used on railroads	Permits required for sale of ice cream	Persons employed in supervision of milk supply
500,000	yes	no	yes	yes	yes	23,000	380	2,800	6 wks.	74	yes	3.5	none	no	no	17
"	yes	yes	yes	yes	yes	240,480	16,000	2,600	3–6 mo.	77	yes	3.0	15	yes	yes	50
"	no	no	....	yes	yes	20,000	....	....	....	....	yes	3.0	12	no	no	....
"	yes	no	yes	yes	yes	450,000	450	12,500	1 mo.	....	yes	3.0	15	yes	no	80
"	no	no	no	no	yes	62,500	6	3,800	....	....	yes	3.35	15	yes	no	10
300,000	yes	no	yes	yes	yes	30,000	46	750	1–6 mo.	....	no	3.0	none	no	no	20
"	yes	no	yes	yes	yes	....	....	139	1 mo.	75	yes	3.4	18	no	no	6
"	yes	no	yes	yes	yes	90,000	500	2,000	1 mo.	61	yes	3.0	none	no	yes	32
"	yes	yes	no	no	yes	25,000	1,050	850	3 mo.	....	yesE	3.0	18	no	no	11
"	yes	no	yes	yes	yes	17,000	59	12,000	8–9 da.	75	yesE	3.5	20	no	no	18
"	yes	yes	....	....	yes	....	....	....	....	....	yesE	3.5	....	....	....	....
200,000	yes	yes	yes	yes	yes	....	25	250	....	68	yesE	3.25	....	yes	yes	....
"	yes	no	yes	yes	yes	16,800	14	10,342	4 mo.	48	yes	3.6	18	no	....	8
"	yes	no	no	no	yes	....	40	250	1 yr.	....	yes	....	16	yes	no	1
"	yes	....	yes	yes	yes	20,000	300	1,200	1–4 mo.	....	yes	2.5	....	yes	no	5
100,000	yes	no	yes	yes	yes	20,000	163	500	6 mo.	41	yes	3.0	none	no	no	5
"	yes	no	yes	no	yes	15,000	20	600	1–3 mo.	55	yes	3.0	16	no	yes	7
"	no	yes	no	no	yes	25,000	18	380	3 mo.	....	yes	3.5	20	no	no	5
"	yes	no	no	no	yes	7,000	15	273	1 da....	....	yes	3.0	....	yes	yes	2
"	yes	no	yes	....	yes	55,000	5	150	....	68	yesE	3.0	20	no	yes	7
"	yes	yes	yes	no	yes	7,000	1	435	....	....	yesE	3.5	....	....	no	5
"	yes	no	no	no	yes	10,000	....	....	....	....	....	3.25	....	yes	no	3
"	yes	....	no	no	yes	....	75	300	....	....	....	....	....	....	yes	5
"	yes	no	yes	no	yes	10,000	3	500	....	....	yes	3.35	15	yes	yes	7
"	yes	no	yes	no	yes	15,000	....	198	1 mo.	75	yes	....	....	no	yes	10
"	yes	no	yes	no	yes	....	....	65	....	....	yes	3.25	18	yes	yes	1
"	no	no	yes	no	yes	20,000	11	600	....	70	yes	3.5	18	no	no	13
50,000	yes	no	yes	yes	yes	15,000	40	250	3 mo.	67	yes	3.25	18	....	no	5
"	yes	no	yes	yes	yes	6,000	40	....	....	47	yes	3.6	20	no	no	4
"	yes	no	yes	no	yes	5,000	2	....	....	75	yes	3.0	none	no	yes	5
"	no	no	no	no	yes	4,700	47	228	3 mo.	....	no	3.0	15	no	no	1
"	yes	yes	yes	yes	yes	70,000	18	850	6 mo.	....	yes	3.0	14	no	yes	6
"	....	....	....	....	yes	8,000	1,000	350	1 mo.	....	yes	3.0	....	yes	....	....
"	yes	no	yes	no	yes	15,000	19	384	4 mo.	60	yes	3.35	15	yes	no	2
"	no	no	no	no	no	20,000	6	....	....	....	yes	3.0	....	yes	no	4
"	yes	no	yes	yes	yes	6,159	88	133	3 da.	77	yes	3.0	16	no	yes	2
"	yes	yes	yes	yes	yes	....	4	250	....	....	yes	....	....	yes	yes	2
"	yes	yes	yes	yes	yes	....	6	192	2 mo.	....	yes	3.5	14	....	yes	5
"	yes	no	yes	....	yes	4,500	....	200	1 wk.	....	yes	3.35	15	....	no	2
"	yes	yes	yes	yes	yes	4,000	6	....	1 mo.	....	yes	3.2	18	no	no	1
"	no	....	no	no	yes	300	82	15	1 wk.	....	yes	....	....	no	no	....
"	yes	yes	no	no	yes	15,000	4	50	1 mo.	....	yes	3.3	20	no	no	10
"	yes	yes	no	no	yes	9,000	7	56	3 mo.	....	yes	3.0	none	no	no	3
40,000	yes	yes	yes	no	yes	....	1	35	1 mo.	79	yes	3.0	....	no	no	2
"	yes	no	no	no	yes	3,926	12	45	1 mo.	....	no	3.5	18	no	no	4
"	yes	yes	yes	no	yes	6,000	6	....	1 mo.	....	yes	3.0	18	no	no	5
"	yes	yes	yes	no	yes	2,500	....	....	2 mo.	....	no	3.5	25	no	no	2
"	yes	yes	no	no	yes	2,500	1	100	1 wk.	....	yes	3 to 4	26to30	no	yes	3
"	yes	yes	yes	yes	yes	2,000	1	75	1 mo.	95	yes	3.5	none	no	yes	2
"	yes	yes	yes	yes	yes	4,000	9	100	3 mo.	55	yes	3.25	18	....	no	3
"	no	no	yes	no	no	12,000	11	35	....	60	yes	....	....	yes	no	1
30,000	yes	no	no	no	yes	500	3	....	....	....	yes	3.0	12	no	yes	....
"	yes	no	yta	yesY	yes	3,500	....	102	1 mo.	....	yes	3.35	15	....	yes	4
"	yes	no	no	no	yes	500	3	175	....	....	yes	3.35	15	yes	yes	2
"	yes	yes	no	no	yes	2,000	2	20	....	....	yes	3.0	18	no	no	3
"	....	no	no	no	no	....	2	75	1 wk.	....	yes	3.0	12	no	no	5
"	yes	no	yes	no	yes	....	2	10	....	....	yes	3.0	....	yes	no	....
"	yes	yes	no	no	yes	1793	1	207	2 mo.	....	yes	3.35	15	yes	no	2
20,000	yes	yes	yes	yes	yes	....	2	65	....	60	yes	....	....	yes	no	3
"	yes	no	yes	no	yes	1,250	....	18	1 yr.	54	yes	....	18	yes	no	2
"	yes	no	no	no	yes	2,000	2	....	2 wk.	....	yes	3.25	18	....	yes	2
"	yes	yes	yes	yes	no	1,280	2	3	1 mo.	83	yes	....	16	....	yes	1
"	yes	yes	yes	no	yes	....	10	27	4 mo.	....	yes	3.25	18	yes	no	1

The cans were closely packed in the car, and the temperature of the car had, in most cases, but little effect upon the temperature of the milk.

There should be, of course, a maximum temperature standard, but this standard can be enforced only gradually at first, otherwise, for a while there would likely be a milk famine. Until the producers can be compelled to properly cool their milk before shipment, the railroad officials can hardly be expected to recognize the importance of the need of refrigerator cars, and unless provision be made for the supervision of the milk before shipment, the use of refrigerator cars is likely to shift upon the railroad companies the burden of cooling much of the milk.

Fifty-six per cent. of the cities have maximum temperature standards, as follows: two per cent. have a standard of 50° F., eight per cent. have one of 55° F., eleven per cent. one of 60° F., two per cent. one of 65° F., and two per cent. one of 70° Fahrenheit.

BUTTER FAT STANDARDS.

Nearly all of the cities have a maximum butter fat standard for milk, and about seventy per cent. have a minimum butter fat standard for cream. The butter fat standard for milk varies from 2.5 per cent. to 3.6 per cent., but only one city has a standard of less than 3.0 per cent. One city has two standards, 3.0 per cent for the winter months, and 4.0 per cent. for the summer months. Thirty-seven per cent. have a standard of 3.0 per cent., thirteen per cent. have one of 3.25 per cent., fourteen per cent. one of 3.35 per cent., nineteen per cent. one of 3.5 per cent., and three per cent. one of 3.6 per cent. Several cities operate under state milk laws, and are not included in the above enumeration. The standards for cream vary from 12 per cent. to 25 per cent. butter fat. Five per cent. of the cities have a standard of 12 per cent., three per cent. have one of 14 per cent., seventeen per cent. one of 15 per cent., six per cent. one of 16 per cent., twenty-one per cent. one of 18 per cent., eight per cent. one of 20 per cent., and two per cent. one of 25 per cent.

From the facts set forth, it may be seen that while many admirable methods are used by various authorities in the administrative control of the milk supply, there is little or no standardization of these methods. Therefore, it seems advisable to have some representative society or body appoint a committee to recommend or establish practical standard methods that would be capable of universal use.

THE ANTI-RABIC INSTITUTE OF THE BOARD OF HEALTH OF GUADALAJARA.

By Dr. FERNANDO BAUDA,
Guadalajara, Mexico.

The results obtained in the Anti-Rabic Institute of the Jalisco Board of Health, from the date of its establishment to the present day, are, it seems to me, of sufficient importance and genuine interest to the public to justify a careful study.

Cases of people bitten by mad dogs who had to be sent hundreds of miles to Mexico City for Pasteur treatment were altogether too frequent, and the urgent need of establishing a special and local anti-rabic institute in the capital of the state became evident to the state government. To this end Doctors Oliva and Toral were commissioned and sent to Mexico City that they might be made immune, and on their return they brought with them the marrow of rabid rabbits, and other necessary materials for the Institute. Several rabbits were inoculated, and shortly afterwards various emulsions were prepared and made ready for emergencies. August 7, 1902, a man bitten by a mad dog was treated, and the treatment was successful. Since that date the Anti-Rabic Institute has been in actual and continuous service.

The specific methods used by us may be but little different from the classic methods of treatment, but for the sake of clearness and completeness they are briefly outlined here.

When an injected rabbit dies, its spinal cord is removed and kept in two different divisions, viz.: the bulb, which is used for the next rabbit inoculation, and the medula, which is used for preparing emulsions for individual treatment of patients. The medula is dried in test tubes over caustic potash, and a good supply is always kept on hand.

Emulsions are prepared as usual; that is, a piece of marrow is placed in a sterilized mortar with enough liquid, and ground until emulsion is perfect.

The treatment is given in two entirely different ways. One treatment, called "simple treatment" is used for patients who have been bitten shortly before the injection, and whose wounds are far removed from nervous centers; this first method is also used every six months

for making immune those practitioners who work in the laboratory. The other method, "the intensive or double series treatment," is used when many days have elapsed since the patient has been bitten, or when the wound is serious and happens to be on the neck, face, or head.

The simple treatment consists of three series of two daily injections in the following manner:

FIRST SERIES.

DAYS	MORNING		AFTERNOON	
1st day	Emulsion No.	9	Emulsion No.	8
2nd day	"	7	"	6
3rd day	"	5	"	4
4th day	"	3	"	2

SECOND SERIES.

5th day	Emulsion No.	9	Emulsion No.	8
6th day	"	7	"	6
7th day	"	5	"	4
8th day	"	3	"	2

THIRD SERIES.

9th day	Emulsion No.	8	Emulsion No.	6
10th day	"	4	"	3
11th day	"	2	"	4
12th day	"	3	"	2

In the table, the number of each emulsion indicates the number of days the marrow has been subjected to the drying action of caustic potash

In the "double treatment" patients are injected four times per day, twice in the morning and twice in the afternoon, as follows:

FIRST SERIES.

1st day	Emulsion No.	9—8	Emulsion No.	7—6
2nd day	"	5—4	"	3—2

SECOND SERIES.

3rd day	Emulsion No.	9—8	Emulsion No.	7—6
4th day	"	5—4	"	3—2

THIRD SERIES.

5th day	Emulsion No.	8—6	Emulsion No.	4—3
6th day	"	2—4	"	3—2

The intensive treatment is used in the greatest number of cases, as it proves to be the safest and the most effective, and has apparently no ill effects.

The following results have been obtained: From August 7, 1902, to July 30, 1910, 845 persons have been injected in the State Anti-Rabic Institute, as follows:

From August 7th, 1902 to January, 1903	27	cases
January, 1903, to January, 1904	46	"
January, 1904, to January, 1905	75	"
January, 1905, to January, 1906	55	"
January, 1906, to January, 1907	65	"
January, 1907, to January, 1908	71	"
January, 1908, to January, 1909	120	"
January, 1909, to January, 1910	271	"
January, 1910, to July, 1910	115	"
Total number of cases	845	

Of these 845 patients, 7 stopped treatment and 7 died of rabies, that is to say, there was .80 per cent mortality.

In the whole Republic of Mexico, where there are many conditions favorable to the spreading of rabies among the too numerous dogs in the city and in the country, it will be next to impossible to exterminate it, as has been done in Denmark, Sweden, and Norway, where no case has been seen in fifty years, and in England also, where the enforced muzzling of all dogs since the year 1905 has resulted in the complete disappearance of the disease.

From what is generally known with reference to the treatment of rabies, it would appear from the foregoing statistics of the Guadalajara Anti-Rabic Institute that the results obtained have been thoroughly satisfactory.

Laboratory Section

METHODS OF COLLECTION, TRANSMISSION AND RECORD IN THE ROUTINE EXAMINATION OF SPINAL FLUIDS.

By A. J. CHESLEY, M. D.,
Laboratory Minnesota State Board of Health.

The occasional specimens of spinal fluid examined previous to 1908 by the Minnesota State Board of Health Laboratory staff were collected by experts in specially prepared outfits. Such specimens were satisfactory, but the demand for the examination of spinal fluid has increased, and specimens collected by general practitioners frequently have been unsatisfactory.

During 1908 and 1909, seventy specimens of spinal fluid taken from fifty patients were examined. Only four cases of epidemic cerebro-spinal meningitis were discovered. Two were of the fulminating type and died, each having received one 15 cc. injection of Flexner's anti-meningitis serum a few hours before death. The other two patients recovered under serum treatment.

Between January 1 and August 1, 1910, thirty specimens of spinal fluid from eleven patients were examined. In the specimens from four patients Weichselbaum's diplococcus was demonstrated by smears and cultures. These cases were treated with Flexner's serum. One made a rapid and complete recovery. Another recovered after a long illness but is entirely blind. The other two patients died and complete post mortem examinations were made.

Spinal fluids from twenty-one cases of epidemic poliomyelitis were examined also in 1909. A bacteriological study of these fluids was made and some experimental work was done.*

Although these examinations were valuable as an aid to correct diagnosis and were of scientific interest, they clearly pointed out the absolute necessity for specific directions, special collection outfits, and data sheets, if such examinations were to be made part of routine public health laboratory work.

The present outfit, mailed to physicians upon request, is packed in the mailing case ordinarily used for diphtheria outfits. It consists of a sterile collection bottle; two 15 cc. bottles of Flexner's serum; "Directions for Collection of Cerebro-spinal Fluid;" a "Spinal Fluid Data" sheet; a letter

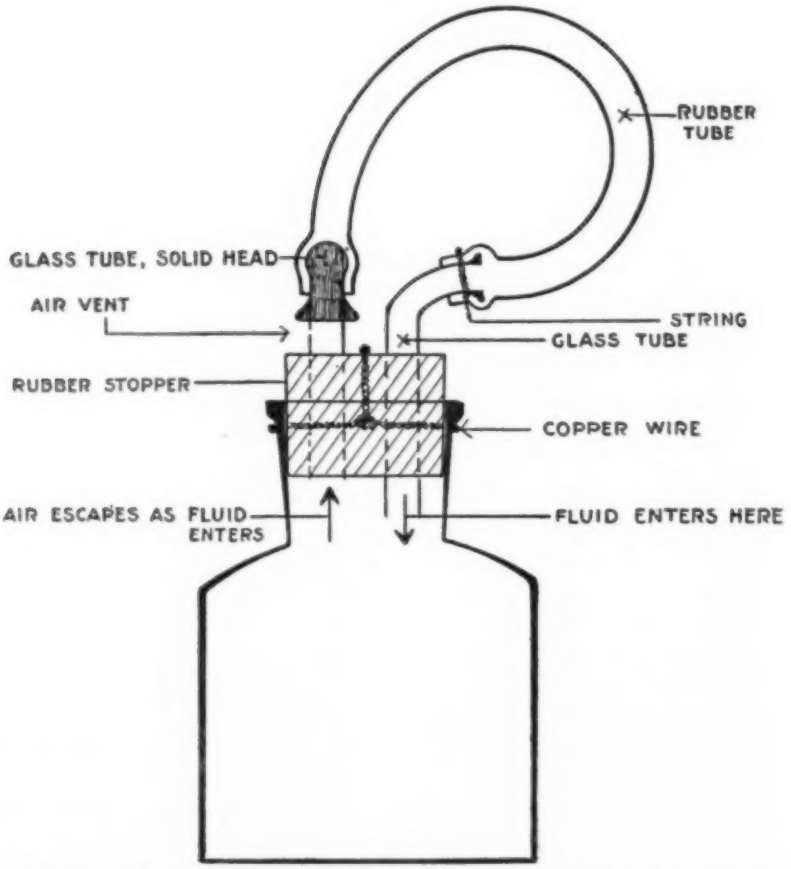
* Pathology and Bacteriology of Acute Anterior Poliomyelitis, by H. E. Robertson, M. D. and A. J. Chesley, M. D. (Archives of Internal Medicine, Sept., 1910, Vol. 6).

of special instructions and advice to the attending physician from the Director of the Laboratory Division; direction for treatment of epidemic cerebro-spinal meningitis, which include Dr. C. H. Dunn's "Summary of the Method of Employing the Anti-meningitis Serum"*; an abstract discussion in the British Medical Journal of October 31, 1908, *re* washing out pus from the spinal canal with normal saline solution, from Dr. Robb, and a note *re* the administration of hexamethylenamin,†

The sketches illustrate the use of the spinal fluid collection bottle.

SPINAL FLUID COLLECTION BOTTLE.

I.

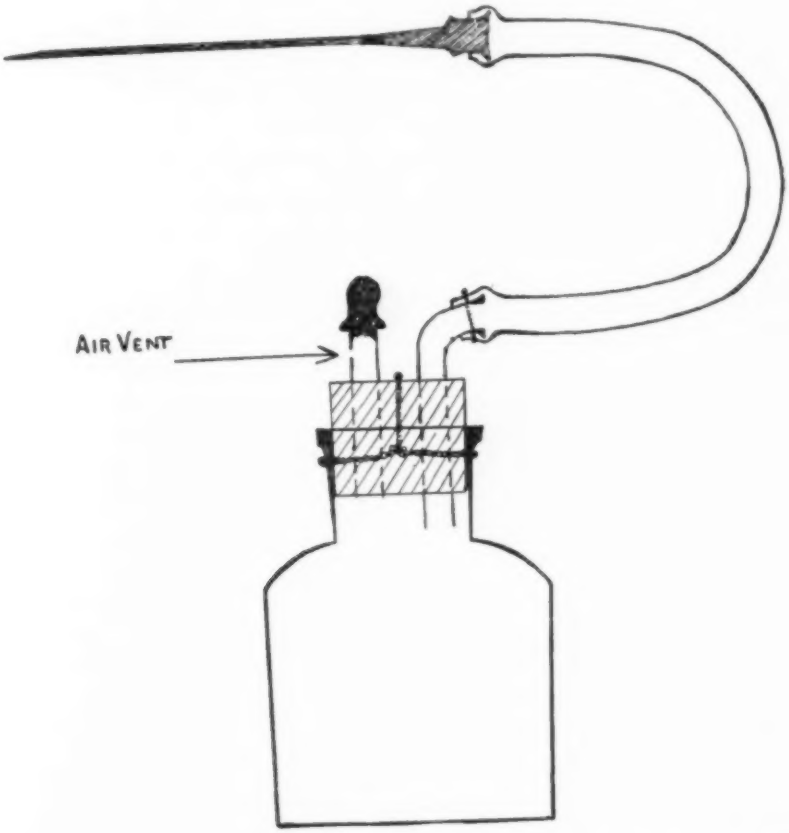


Sketch showing bottle after removal of cloth hood. Air vent is open.

* Boston Medical and Surgical Journal, 1908, clix, 843.
† Johns Hopkins Hospital Bulletin, Vol. XX, No. 217, page 102

SPINAL FLUID COLLECTION BOTTLE.

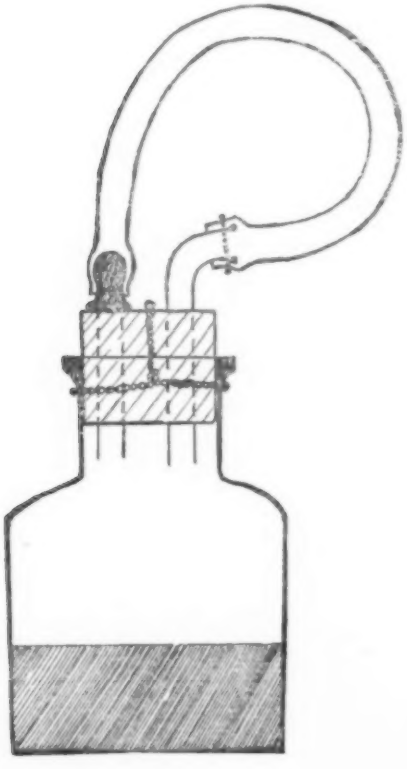
II.



Sketch showing the connection with the needle after its introduction into the spinal canal.

SPINAL FLUID COLLECTION BOTTLE.

III.



Bottle after collection of spinal fluid. First, the air vent is closed by pushing tube into rubber stopper, then the end of rubber tubing is slipped over the solid knob of the tube and cloth hood replaced and tied to protect the tubes during transit.

Following are the forms used in connection with this work:

DIRECTIONS FOR COLLECTION OF CEREBRO-SPINAL FLUID.

1. To STERILIZE SYRINGE: Boil for six minutes a large syringe and two spinal needles with obturators inside.

2. To WARM SERUM AND SALT SOLUTION TO BODY TEMPERATURE: Pour some of the hot water into another dish and add cold water until temperature is 105° F. to 110° F. by your clinical thermometer. Into this water, which should be about 1 inch deep, set the salt solution and serum bottles. Do not allow the necks or stoppers of serum bottles to get wet.

3. To PREPARE SPECIMEN BOTTLE: Untie string holding cloth hood and remove cloth. Do not disturb the rubber tubing or the stopper. The bottle is now ready for use (See No. 6) if the vertical glass tube shows a mark just above the stopper. This mark defines the level of the air vent on one side of this tube, and if it is not in sight, gently pull the tube out until the mark just shows.

4. To PREPARE PATIENT: Place patient on one side with back curved to separate spines of vertebrae. Count spinous processes and clean skin between 2nd and 5th lumbar vertebrae with 5% phenol followed by alcohol. Give local or general anesthetic if necessary.

5. To MAKE LUMBAR PUNCTURE: Insert needle about ½-inch to one side the median line midway between the 3d and 4th lumbar spines, slanting needle slightly upward and toward the median line so the point will cross it when needle has been inserted about 1¾ inches. If bone is struck, withdraw needle and try again a little to one side. A cessation of resistance when needle is inserted about 1½ to 3 inches (according to patient's age) marks its entrance into the canal.

6. To COLLECT FLUID: Remove obturator from needle *in situ*. (If fluid is too thick to flow through the needle, fill syringe with sterile physiological salt solution as directed under 7 and 8 and inject to wash out and thin the pus.) Take specimen bottle in left hand. Hold stopper and vertical tube between thumb and finger and pull off untied end of rubber tubing. Slip this end of tubing over needle and allow spinal fluid to flow directly into sterile bottle, thus avoiding danger of contamination through exposure to air, etc. When flow ceases or the bottle is filled, carefully pull tubing off needle and fit it over the end of vertical tube as you found it. Push the tube into the stopper as far as it will go. This buries the air vent in the stopper and prevents leakage during transit. The cloth hood should now be tied securely over all.

7. To FILL SYRINGE WITH SERUM OR SALT SOLUTION: Remove obturator from extra needle and fit needle to syringe. Carefully remove stopper from bottle and fill syringe directly from bottle without touching its mouth or neck.

8. To INJECT SERUM OR SALT SOLUTION: Disconnect needle and fit filled syringe to needle inserted in spinal canal and inject slowly.

9. To DRESS PUNCTURE WOUND: After withdrawing needle, seal the wound with collodion dressing.

10. FILL OUT WITHOUT DELAY all the blanks enclosed and forward with the specimen to

THE DIRECTOR OF THE LABORATORY DIVISION,
Minnesota State Board of Health,
University Campus,
Minneapolis, Minn.

SPINAL FLUID DATA

LABORATORY DIVISION, MINNESOTA STATE BOARD OF HEALTH

UNIVERSITY CAMPUS, MINNEAPOLIS.

Patient's Name ..... Age..... Sex .....

*Township / Village / City Residence..... Co. .....

P. O. Address..... Occupation .....

This illness began on ..... 19...., with symptoms as follows.....
date

.....

.....

.....

..... up to date.

What previous sickness or injury has the patient had which may have some relation to this attack?.....

Present condition.....19..... General development.....
date

Nutritional condition .....

Posture in bed.....

Eruption; character and extent.....

.....

Temp. ..... Pulse ..... Resp.....

Mental condition .....

Sensory disturbances .....

.....

Pain and tenderness; character and location.....

Motor disturbances and paralysis .....

.....

Bladder ..... Rectum .....

Convulsions; ....., character and duration.....

.....

Muscular rigidity .....

Reflexes: Pupil.....

Knee.....

Ankle .....

Babinski.....

Kernig.....

Leucocyte count..... Differential count .....

Lumbar puncture made under *local / general anesthetic at *a. m. / p. m. .....19.... by
no date

Dr. .....

About.....cc. of *clear / cloudy / bloody spinal fluid, flowing under.....

pressure, was drawn directly into.....

Describe effect of lumbar puncture. .....

.....

GIVE NAMES AND AGES OF PERSONS IN SAME HOUSE WITH PATIENT.

.....

.....

.....

Remarks on this or similar cases in vicinity.....

.....

Clinical diagnosis .....Physician.....

Address.....

* Strike out words or letters that do not apply.

ADDITIONAL DATA FOR CASE RECEIVING ANTI-MENINGITIS SERUM TREATMENT.*

Can every requirement of the letter concerning the use of Flexner's serum be carried out? .....

.....

Amount of serum injected today = ... cc.

Send ..... cc. of Flexner's serum and spinal fluid collection outfit to Dr. .....

by mail or by .....Express Co for treatment of this case.

(FOR LABORATORY USE ONLY.)

Specimen received ..... by .....

Smears directly from fluid.....

.....

Smears from sediment after centrifugalization .....

.....

.....

Cultures .....

.....

.....

Animal inoculation .....

.....

.....

.....

Findings, bacteriological.....

pathological .....

.....

(* Reverse spinal fluid circular.)

LABORATORY DIVISION, MINNESOTA STATE BOARD OF HEALTH,

University Campus, Minneapolis, Minn.

DEAR DOCTOR:*

Since the serum treatment of meningitis is still in the experimental stage, and on account of the difficulty in preparation and limited amount of serum available, Dr. Flexner permits its use only under the following conditions which must be accepted by all concerned before beginning serum treatment.

The patient's family or friends, the attending physician, and the laboratory staff, must co-operate and assist one another in every way to insure a thorough scientific study of the case, not only for the successful treatment of this patient, but also that other patients in the future may receive the benefit derived from the study of this case.

The patient's family must assist in the observation of the case and permit a post mortem examination to be made by the attending physician and a member of the laboratory staff, if the patient dies.

The attending physician must make a full report on the clinical symptoms and treatment throughout the course of the disease. This report should include differential blood counts before and about twelve hours after each serum treatment as well as careful observation and comments upon the effect of the serum. He is also required to fill out the data blanks attached to the serum and specimen bottles and forward the empty bottles and the specimen of cerebro-spinal fluid to the laboratory without delay.

The laboratory will issue serum, and sterile specimen bottles, with detailed instructions for the use of the serum and collection of the specimen; will make microscopic and cultural examination of every specimen of cerebro-spinal fluid received and report results to attending physicians; if the patient dies, will furnish a pathologist with proper equipment for autopsy; finally, will send a complete report of the case to Dr. Flexner, omitting the patient's name.

The acceptance of the serum implies that all parties agree to carry out the above requirements.

Yours very truly,

F. F. WESBROOK, Director.

* This letter is sent only when Flexner's serum is too be used.

A RESUME OF DIPHTHERIA EXAMINATIONS MADE IN THE BOSTON BOARD OF HEALTH BACTERIOLOGICAL LABORATORY IN 1909.

By FRANCIS H. SLACK, M. D.*

During the year 1909 there were examined in the Boston Board of Health Bacteriological Laboratory 28,557 diphtheria cultures; 20,324 of these being in the course of the regular routine of the laboratory and 8,233 on special investigative work in relation to the presence of "diphtheria bacillus carriers" among children in the public schools.† An average of about twenty-two cultures were examined for each of 936 different physicians who availed themselves of the opportunities offered for diphtheria diagnosis.

ROUTINE EXAMINATIONS.

TABLE I.

SHOWING ROUTINE CULTURES CLASSIFIED.

	Positive	Negative	No Growth	Total
Primary	1668	10,784	93	12,545
Secondary	1957	5,774	48	7,779
	3625	16,558	141	20,324
	18%	81%	1%	

Perhaps the most striking feature of this table is the large number of primary negatives, more than half the total tests. This is an indication of the general use of the laboratory in cases where there is the slightest suspicion of diphtheria, in many cases cultures being made more for the purpose of excluding possible diphtheria than from any belief in its presence. Physicians who are most familiar with clinical diphtheria freely confess their dependence on the laboratory for aid in diagnosis.

It is compulsory that diphtheria be reported to the Board of Health, and 2720 cases were reported during the year. Of these, the laboratory diagnosed 1858, or over 68 per cent., 1668 of these diagnoses being on primary cultures and the remainder secondary. For every 100 cases reported 747 examinations were made, 555 of these being for diagnosis and 192 for release. Cultures from 1059 different persons were examined, on an average, each month.

* Formerly Director, Boston Board of Health Laboratory.
† Journal A. M. A., March 19, 1910.

ISOLATION OF PATIENTS.

Diphtheria cases, when isolated at home, are kept in quarantine until two successive negative cultures, taken at least twenty-four hours apart, have been obtained. These release cultures must be taken from both nose and throat, the first to be taken by the attending physician and the second by a medical agent of the Board of Health. Cases sent to the city hospital are released by the hospital authorities, who make their own cultural tests.

TABLE II.

SHOWING NEGATIVE CULTURES OBTAINED FOR RELEASE, INCLUDING PREMATURE NEGATIVES. ALL WERE RELEASED ON TWO CONSECUTIVE NEGATIVES.

Month	Positive Cases Released on Two Negatives	Positive Cases Showing Premature Negatives	Per Cent. of Positive Cases Showing Premature Negatives
February, 1909	54	8	15
March	63	13	21
April	67	7	10
May	92	29	31
June	73	23	31
July	67	14	21
August	26	3	12
September	46	20	43
October	90	14	15
November	113	24	21
December	134	34	25
January, 1910	101	32	32
Total	926	221	24%

Column 1 shows total positive cases which were released on two consecutive negatives.

Column 2 shows the number of these which, during the taking of cultures for release, yielded a negative culture followed by a positive.

Column 3 shows that if release were granted on one negative culture only, 24 per cent. of the total positive cases released by the laboratory would still carry the bacilli after such release.

Since diphtheria is an acute bacterial disease, isolation of those suffering from it until they are free from the organisms seems the only logical procedure, if we are to protect others from infection. If by chance morphologically typical organisms are found in the secretions of the nose or the throat of a normal individual, we face an altogether different proposition, and it would be but fair, before rigorously quarantining such a person, to test the organisms for virulence, especially if there has been no known exposure.

It is fairly safe to assume that where a person has suffered from diphtheria and still carries the organisms in the throat or nasal secretions, when opportunity is offered these organisms will again produce the disease in a susceptible person; also that when a person recently exposed to the

disease is found to be a diphtheria bacillus carrier, though showing personally no symptoms of the disease, such a one is a menace to the health of others and should be isolated until he is free from the organisms or they are proved to be non-virulent.

DURATION OF DISEASE.

Our information as to the duration of cases is necessarily based on those cases which were both diagnosed and released by the laboratory.

TABLE III.

SHOWING AVERAGE LENGTH IN DAYS AND WEEKS FROM DATE OF FIRST POSITIVE TO SECOND NEGATIVE.

Month	No. of cases	Average in days	No. cases running less than 1 week	No. cases running between 1 and 2 weeks	No. cases running between 2 and 3 weeks	No. cases running more than 3 weeks
February, '09..	52	14.4	5	20	18	9
March.....	60	14.8	14	18	15	13
April.....	56	13.5	7	26	13	10
May.....	88	17.4	13	40	16	20
June.....	67	13.4	13	34	11	9
July.....	64	11.2	9	41	11	3
August.....	22	10.2	6	12	2	2
September.....	31	15.9	4	10	8	9
October.....	75	12.4	16	33	16	10
November.....	102	15.5	17	45	20	20
December.....	127	16.4	20	36	33	38
January, '10....	89	14.5	9	36	15	28
	833	14.6	133 or 16%	351 or 42%	178 or 21%	171 or 21%

The average duration of diphtheria cases was 14.6 days; 97 cases ran between three and four weeks, 34 between four and five weeks, and 40 over five weeks; the longest in duration was 73 days.

VIRULENCE TESTS.

As has been shown, there is a small percentage of cases where the bacilli persist for weeks and even months. In such cases, if the patient has fully recovered from his symptoms and is impatient to be at liberty, it is the custom, on request, to make virulence tests, releasing if the organism proves non-virulent, otherwise keeping the patient still in isolation. Of thirty-three such tests made during the year, eighteen were positive, twelve negative, and three showed slight virulence.

SWAB EXAMINATIONS AND SHORT INCUBATION TESTS.

It is our desire to return diagnoses to the physicians as quickly as possible. Examinations of swabs are made whenever requested, and all diagnosis cultures coming in before noon are placed in the incubator at

noon and examined about five o'clock. By these means many cases are diagnosed hours earlier than would otherwise be the case, and the patient has the benefit of a much earlier administration of antitoxin.

TABLE IV.

COMPARATIVE RESULTS FROM SWAB EXAMINATIONS AND SHORT INCUBATION AND OVER NIGHT INCUBATION RESULTS.

A

SWAB EXAMINATIONS AND OVER NIGHT INCUBATIONS.

		Positive Cases	Negative Cases
Swab +	Culture +	143	0
Swab ?	Culture +	26	0
Swab —	Culture +	67	0
Swab —	Culture —	9	588
Swab ?	Culture —	1	36
Swab +	Culture —	15	0
		254	631

B

SHORT INCUBATIONS AND OVER NIGHT INCUBATIONS.

		Positive Cases	Negative Cases
Short +	Over night +	123	0
Short ?	Over night +	15	0
Short —	Over night +	23	0
Short —	Over night —	9	593
Short ?	Over night —	3	8
Short +	Over night —	6	0
		179	601

Out of 885 swabs examined during the year, 740, or 83.6 per cent., were reported as the cultures proved. Of the remaining 145, 26 were reported suspicious and came positive, bringing the total of reliable results up to 86.5 per cent.

Unless a swab examination is positive, a final report is not given until after incubation of the culture. Sixty-seven of these cases showed nothing suspicious on the swabs but gave positive cultures. Fifteen cases, positive on the swab, were negative after incubation, either because the diphtheria organisms were overgrown in the cultures or because a second introduction of the swab for material for the examination reached foci not touched in swabbing for the culture.

Of the 780 short incubations made, 725, or 92.5 per cent., were reported as the longer incubation proved, the incubation in these cases being necessarily about five hours longer than usual. Fifteen were reported suspicious and came positive, bringing the total of reliable reports up to 94.8 per cent. Twenty-three, with a "probable negative" finding on the shorter, were positive on the longer incubation. Eleven, reported suspicious, were negative, although in three of these succeeding cultures were positive; six positive on the short incubation were overgrown on longer incuba-

tion. With all these preliminary examinations it is the custom to proceed with the regular incubation, and with the exception of the positive findings, final reports are not given until the results of the full incubation are known.

INFORMATION GIVEN BY THE PHYSICIAN.

The usual cards for information concerning the patient accompany each diphtheria outfit, and these, after the diagnosis is made and recorded, are kept on file in the laboratory for ready reference. Leaving out of consideration those cards submitted from schools and other public institutions, where many cultures are taken from normal persons to exclude diphtheria, we have a record for the year (1909) of 1529 primary positives and 7583 primary negatives.

SEX.

Of the positives, 710 are male and 819 female.

Of the negatives, 3417 are male and 4166 female.

AGE

TABLE V.

SHOWING AGE. POSITIVE AND NEGATIVE EXAMINATIONS.

POSITIVES

	Under 1	1–5	6–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	Not given
Male.....	34	305	205	86	35	22	4	1				18
Female...	26	273	247	130	66	25	12	5	3			32
	60	578	452	216	101	47	16	6	3			50
	4—%	37+%	29+%	14+%	6+%	3+%	1+%	⅜%	⅕%			3+%

NEGATIVES.

	Under 1	1–5	6–10	11–20	21–30	31–40	41–50	51–60	61–70	71–80	81–90	Not given
Male.....	241	1235	599	575	363	137	49	8	7	4	2	197
Female..	175	1144	692	798	684	283	93	41	14	2	2	238
	416	2379	1291	1373	1047	420	142	49	21	6	4	435
	5½%	31+%	17+%	18+%	13+%	5+%	2—%					5¾%

70 per cent. of the positives were in children under ten years of age, less than 4 per cent. being in those under one year, over 37 per cent. in children between one and five, and over 29 per cent. in children between five and ten. From five years up there is a noticeable preponderance of the disease in females, though under five years the males have a few more cases. The same is true in the negatives, which for the most part represent tonsilitis and similar infectious conditions. This is probably due to the closer association of the older girls and women with the sick.

DURATION OF SICKNESS BEFORE CULTURE WAS SUBMITTED.

TABLE VI.

POSITIVES.

	1st day of sickness	2d day	3d day	4th day	More than 4 days	Not given
Male	34	141	126	79	95	235
Female	32	188	149	72	115	263
	66 4+%	329 21+%	275 18—%	151 10—%	210 14—%	498 32+%

NEGATIVES.

	1st day of sickness	2d day	3d day	4th day	More than 4 days	Not given
Male	120	597	659	308	558	1175
Female	167	850	810	366	611	1362
	287 4—%	1447 19+%	1469 19+%	674 9—%	1169 15+%	2537 33+%

The majority of cultures are taken on the second and third days of illness, and it is probable that in most instances the physician is not called until the patient has been ill about this length of time. The parallel between the positive and negative tables is rather striking.

LOCATION FROM WHICH CULTURE WAS TAKEN.

TABLE VII.

POSITIVES.

	Nose	Throat	Nose and Throat	Not given
Male	76	388	171	75
Female	58	468	191	102
	134 9—%	856 56%	362 24—%	177 11+%

NEGATIVES.

	Nose	Throat	Nose and Throat	Not Given
Male	271	1991	779	376
Female	253	2492	1001	420
	524 7—%	4483 59+%	1780 23+%	796 10+%

Freak cultures, including thirty-three eye and twelve ear cultures negative, and four eye and four ear cultures positive, have been omitted from this tabulation.

PHYSICIANS' DIAGNOSES.

TABLE VIII.

POSITIVES.

	Diphtheria	? Diph	?	Croup	Tonsilitis	? Tons	Pharyngitis
Male	160	51	36	8	107	10	5
Female	187	65	60	4	135	10	13
	347	116	96	12	242	20	18
	23—%	7+%	6+%	1—%	16—%	1+%	1+%

	Laryngitis	Rhinitis	Other Diagnoses	Not Made
Male	5	9	32	287
Female	8	4	38	295
	13	13	70	582
	1—%	1—%	5—%	38+%

NEGATIVES.

	Diphtheria	? Diph	?	Croup	Tonsilitis	? Tons	Pharyngitis
Male	124	110	201	27	873	68	61
Female	168	169	225	19	1301	105	89
	292	279	426	46	2174	173	150
	4—%	4—%	5+%	1—%	28+%	2+%	2—%

	Laryngitis	Rhinitis	Other Diagnoses	Not Made
Male	38	95	192	1628
Female	25	91	208	1766
	63	186	400	3394
	1—%	2+%	5+%	45—%

It will be seen that only about 23 per cent. of the positives had a definite diagnosis of diphtheria made by the physician. About 25 per cent. were definitely diagnosed otherwise, while the large number—38 per cent.—in which no attempt, so far as we can tell from the card, was made to diagnose the condition before receiving the culture report, is in itself an indication of the reliance upon the laboratory for diagnosis.

Of the primary negatives less than 4 per cent. were diagnosed as diphtheria by the physicians. Some of these so diagnosed, as shown by succeeding examinations, were diphtheria. It is our rule when the physician's diagnosis is diphtheria, when we find suspicious organisms, or when it is stated that there is a membrane on the pharynx or larynx, to ask for other cultures. We have a record for the year of twenty-five cultures, out of the 292 requested because of the physicians' diagnosis, coming positive on secondary tests.

Thus out of a total of 639 clinical diagnoses of diphtheria we have 372 bacteriological confirmations or a little over 58 per cent. (The tables were based on the primary examinations only.) Others of these cases are sent directly to the hospital without waiting for further culture tests, so the final total would probably show about 60 per cent. of cases where the clinical diagnosis of diphtheria is confirmed by the bacterial findings.

Of 395	cases	diagnosed	? Diphtheria	30%	proved to be	Diphtheria.
Of 522	"	"	?	18%	"	"
Of 58	"	"	Croup	20%	"	"
Of 2316	"	"	Tonsilitis	10%	"	"
Of 193	"	"	? Tonsilitis	10%	"	"
Of 168	"	"	Pharyngitis	10%	"	"
Of 76	"	"	Laryngitis	17%	"	"
Of 199	"	"	Rhinitis	6%	"	"

Of 470 with other miscellaneous diagnoses, 14% proved to be diphtheria, and of 3966 in which no diagnosis was made, 14% proved to be diphtheria.

MEMBRANE.

TABLE IX.

POSITIVES.

	Nares	Pharynx	Tonsils	Larynx	Pharynx & Tons.	Other Combinations	Absent	Not Stated
Male...	16	4	216	1	39	32	168	234
Female	17	13	249	3	63	29	166	279
	33	17	465	4	102	61	334	513
	2+%	1+%	30+%	¼%	7—%	4%	22—%	33+%

NEGATIVES.

	Nares	Pharynx	Tonsils	Larynx	Pharynx & Tons.	Other Combinations	Absent	Not Stated
Male...	34	24	465	7	60	58	1473	1296
Female	25	35	657	13	97	86	1651	1602
	59	59	1122	20	157	144	3124	2898
	1—%	1—%	15—%	¼%	2+%	2—%	41+%	38—%

We have a table here of 2243 cases in which membrane is said to be present, with but 682 or 30 per cent. in which *B. diphtheriae* was demonstrated. Diphtheria bacilli were found in a little less than 10 per cent. where membrane was definitely stated as absent, and in 15 per cent. where no information is given on this subject.

EXUDATE.

TABLE X.

POSITIVES.

	Nares	Pharynx	Tonsils	Larynx	Combinations	Absent	Not Stated
Male	52	13	189	3	94	77	282
Female	58	9	217	4	86	87	358
	110	22	406	7	180	164	640
	7+%	1+%	26+%	½%	12—%	11—%	42—%

NEGATIVES.

	Nares	Pharynx	Tonsils	Larynx	Combinations	Absent	Not Stated
Male	193	34	1208	16	330	678	958
Female	162	51	1509	8	372	836	1228
	355	85	2717	24	702	1514	2186
	5—%	1+%	35+%	½%	9+%	20—%	28+%

Of 4608 cases where it was stated that exudate was present we found diphtheria bacilli in 725, or about 15 per cent.

Diphtheria bacilli were found in a little less than 10 per cent. of the cases where it was definitely stated there was no exudate, and in over 22 per cent. where no information was given.

CONCLUSIONS.

1. Diphtheria cases should be isolated until two successive negative cultures, taken at least twenty-four hours apart, have been obtained, unless the infecting organism has been proved non-virulent.

2. Patients so isolated are not restrained longer than, nor probably on the average so long as, where an arbitrary time limit of isolation of say ten days from the disappearance of the membrane is enforced.

3. In the majority of cases of clinical diphtheria, the organisms are virulent as long as they persist, regardless of the condition of health of the patient.

4. Swab examinations and short incubation tests are of great value in affording quicker diagnoses.

5. Females have the disease in a slightly larger proportion than males, and the majority of cases are between the ages of one and ten.

6. It is usually at least the second or third day of the illness before proper attempts are made at diagnosis.

7. A bacteriological examination is essential in the diagnosis of diphtheria.

8. The presence or absence of membrane or exudate, as interpreted by the average physician, does not appear to have much bearing on the final diagnosis.

THE QUANTITATIVE DETERMINATION OF B. COLI IN HEAVILY POLLUTED WATERS: A STUDY OF THE PRESUMPTIVE TESTS.

By Dr. GUSTAV F. RUEDIGER and Dr. FREDERICK A. SLYFIELD,

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A great many substances have been recommended for the rapid and easy detection of *B. coli* in polluted waters. Practically all of these have the disadvantage of giving only a probable indication of the presence of this organism. All of these presumptive tests have been studied in great detail by a number of investigators, but most of these investigations have aimed to determine what percentage of the fermentation tubes containing gas actually contained *B. coli*. It has occurred to us that more extensive studies should be made to determine how frequently the presumptive tests give a negative result when colon bacilli in all probability are present. In order to determine this point, we experimented entirely with the waters of Red Lake River and Red River because our laboratory records gave us a very fair idea as to the amount of pollution of these two rivers immediately above the city of Grand Forks. Our method of study was as follows:

Samples were collected and immediately plated in litmus lactose agar. The amount of water that was put in each plate was determined by looking over our records of previous analyses of samples collected at that particular hour and at that time of the year. If our previous records indicated that the sample probably contained 20 *B. coli* per cubic centimeter, we inoculated four plates each with one-fourth of a cubic centimeter. At the same time we inoculated a series of fermentation tubes containing neutral red lactose broth, lactose bile and sodium taurocholate broth, as recommended by MacConkey and Hill.

In these series we endeavored to inoculate each fermentation tube with so small a fraction of a cubic centimeter of the sample that some of the tubes would not contain *B. coli*, but in at least half of them we aimed to get gas production. For instance, if we estimated that the sample of water contained 15 to 16 *B. coli* per cc. we would inoculate ten tubes of each kind of media with one-twentieth cc., thus using one-half cc. for each kind of media. If now seven of these with one kind of media showed gas on the

third day we would conclude that the sample contained approximately 14 *B. coli* per cc. If our previous records indicated that the sample probably would contain only 2 *B. coli* per cc., then we would inoculate series of four to six tubes of each medium with one-fourth cc. If all of the tubes showed gas within three days we had to conclude that the number of *B. coli* per cc. was greater than the denominator of the fraction of a cubic centimeter put into each tube.

Twenty-five series of fermentation tubes were thus inoculated, the three kinds of media above referred to being used. In all instances litmus lactose agar plates were made at the same time, and all plates and fermentation tubes were incubated at 39° C. The plates were taken out of the incubator at the end of about thirty-six hours, and the number of probable *B.coli* colonies per cubic centimeter was recorded. Lactose agar stab cultures were then made from these colonies, to determine how many actually were *B. coli*. We accepted the culture as one of *B. coli* only when it was found to produce gas in lactose agar, indol in Dunham's solution, and did not liquefy gelatin.

The results of this study are not easily summarized in a few words. The following statements, however, will give a fairly good idea of the results that were obtained:

Neutral Red Lactose Bouillon Tubes: Twenty-five series of tubes of this medium were studied. In fifteen series the results agreed with those obtained by means of plates. In six series the results were too low, and in four series they were higher than those obtained with the plates. We should state, however, that in two of these series, where the fermentation tubes gave higher results than the plates, we had forgotten to incubate the plates for the first twenty-four hours. This gave the saprophytic bacteria a good start and we believe that this explained why the number of *B. coli* found in the plates was so low in these two series. This statement applies as well to the corresponding result with the lactose bile tubes.

Lactose Bile Tubes: Twenty-five series were made with this medium. Eleven of these agreed with the results obtained by the plate method. In ten series the results were too low, and in four series they were high.

Lactose Bile-salt Media: Nineteen series were made with this medium. Eight agreed with the results obtained by the plate method, eight were too low, and three gave higher results than those obtained by the plate method.

The results from this study show that neutral red lactose bouillon is the most reliable of the media studied by us for the presumptive test for *B. coli*.

The media used in these tests were prepared as follows:

Neutral red lactose bouillon was made by adding 1 per cent. of lactose and 1 per cent. of a 0.5 per cent. aqueous solution of neutral red to 0.8 per cent. acid bouillon, made from meat infusion.

Lactose bile was made by dissolving 1 per cent. of peptone and 1 per cent. of lactose in fresh undiluted ox bile. The peptone was dissolved by the aid of heat; the solution was then filtered through cotton, tubed and sterilized.

The sodium taurocholate broth was made by dissolving 2 per cent. of peptone, 0.5 per cent. of sodium taurocholate and 0.5 per cent. of lactose in distilled water. Lactose was used in place of dextrose as recommended by MacConkey and Hill. Dextrose was also used in a few parallel series, but the results were not very different from those obtained with lactose. We did not add litmus solution to the media.

Litmus lactose agar plates were made from nearly all fermentation tubes that showed gas within three days, in the hope of isolating *B. coli* in pure culture. These plates were made as soon as the tube was found to have over 15 per cent. of gas, and further gas production had apparently ceased. We did not leave the tube in the incubator until the end of three days, if it was found to have gas earlier.

Ninety-six neutral red lactose broth tubes having gas were used for plates. In ninety of these *B. coli* were found, and six, or 6.2 per cent., gave negative results.

Eighty-three lactose bile tubes having gas were plated for *B. coli* with sixty-nine positive results, and fourteen, or 16.8 per cent., negative results.

Thirty-five bile-salt broth tubes having gas were plated for *B. coli* with thirty positive results, and five, or 14.3 per cent., negative results. Three of these negative results were obtained from tubes containing dextrose.

In this study of various media the neutral red lactose broth gave the best results.

Our negative results from the lactose bile tubes are higher than those reported by other investigators. We cannot explain this fact. We should like to point out, however, that most of the tubes which gave negative results did not show gas before the third day.

It would seem, therefore, that *B. coli* might be found in a larger percentage of positive lactose bile tubes, if only those were plated which showed over 15 per cent. of gas during the first forty-eight hours. Our experience has shown, however, that the number of positive tubes is too low if the tubes are kept under observation only forty-eight hours in making a quantative determination of the *B. coli* present. In many instances none of the bile tubes showed gas on the second day, whereas several of them would have gas on the third day.

Fromme* working in the Hygienic Institute of Hamburg, has very recently shown that *B. coli* multiplies nearly five times as rapidly in 1 per cent. dextrose broth as in lactose bile. It appears, however, that he did not add peptone to the bile in his experiments. We repeated this experiment with lactose bile containing 1 per cent. of peptone and the neutral red lactose broth. Our experiments are as yet inconclusive, but they indicate that some strains of *B. coli* multiply about as rapidly in lactose bile as in the neutral red lactose broth, while some strains multiply more rapidly in the neutral red lactose broth.

To test further this inhibitive effect of bile over certain strains of *B. coli*, we prepared an agar medium by dissolving ten grams of agar-agar thread, ten grams of peptone and ten grams of lactose in 1000 cc. of fresh undiluted ox bile. We also made ordinary neutral lactose agar containing only 1 per cent. of agar-agar thread. This medium was made with meat infusion and not with beef extract. We then plated equal quantities of polluted water in these two media, adding in each case 2½ per cent. sterile litmus solution, After forty-eight hours incubation we invariably found more red colonies in the plates made with ordinary litmus lactose agar. It seems, however, that practically all of the red colonies in the bile agar are *B. coli*, which is not the case in the other plates. It seems that less *B. coli* colonies will be found in the bile agar than in ordinary litmus lactose agar, although our work is not far enough advanced to draw positive conclusions. The total number of colonies in the bile agar plates frequently was less than one-third as high as that in the other plates.

DISCUSSION OF RESULTS.

In making quantitative determinations of *B. coli* in polluted waters by means of fermentation tubes, the most accurate results are obtained by the use of neutral red lactose bouillon. In twenty-five tests where the results were compared with those obtained by means of litmus lactose agar plates, fifteen were in agreement, six were too low and four were higher than was indicated by the plates. In two of the latter we have reason to believe that the results given by the plates were too low and those by the fermentation tubes were nearly correct.

When lactose bile was used in the fermentation tubes, eleven results out of twenty-five agreed with those obtained with litmus lactose agar plates, ten results were too low and four were higher than those given by the plates. In two of the latter the plates appeared to give too low a result.

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*Zeitschr. f. Hygiene, 1910, Vol. 65, p. 251.

With the use of lactose bile-salt broth only eight results out of nineteen were in agreement with those given by the plates; eight were too low and three were too high.

In this study it was evident that gas appears earlier in the neutral red lactose bouillon tubes than in the bile tubes, and that *B. coli* can be easily isolated from a larger percentage of the positive tubes with neutral red lactose bouillon than with the positive lactose bile tubes. The finding of *B. coli* in the fermentation tubes is greatly facilitated by making plates soon after the appearance of gas. We must state, however, that the water we used in this study gave a relatively low bacterial count with a large number of *B. coli* per cubic centimeter. Different results might be obtained with a water giving a high bacterial count with relatively few *B. coli*.

THE VALUE OF THE ESCULIN TEST.

F. E. HALE and T. W. MELIA,
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In August, 1908, F. C. Harrison and J. Van der Leck* read a paper before the Laboratory Section of the American Public Health Association, during the convention held at Winnipeg, presenting the results of their experience with a new presumptive test for "excretal *B. coli.*" This test consists in the production of a black color in the medium employed, whether liquid or solid. The formula given by them is as follows:

LIQUID MEDIA.

1 or 2% Witte's peptone.
0.5% sodium taurocholate (commercial)†
0.1% esculin.
0.05% iron citrate.‡
100 cc. water.

SOLID MEDIA.

As above with 1.5% agar.

The net results of their work were as follows:

B. coli, *B. aerogenes*, lactose fermenting yeasts, and some molds gave the test. Forty other species or varieties of bacteria and yeasts did not give the test. In sixty samples of water giving the test they succeeded in isolating *B. coli* or *B. aerogenes*.

From experiments with the medium, with bile salts omitted, they had not reached definite conclusions, but believed that the results would prove as satisfactory and more delicate.

This medium offered such attractive possibilities that we began testing it at once. As the value of the test for routine water work depends upon its specific character, tests were made upon all the strains of varieties and species of bacteria in our possession, employing the liquid formula (1 per cent. peptone) with and without bile salt in test tubes. All cultures tested were previously rejuvenated in beef broth and plated out before testing. The following table gives the results of these experiments:

* Am. Jour. Pub. Hyg., Vol. 19, No. 3, page 557, Aug., 1909; also Trans. Royal Soc. Can. (3) 2,IV, 105-110, 1908.

† The term sodium glycocholate should be substituted for taurocholate in the above formula, since the glycocholate is the salt actually present in the commercial taurocholate.

‡ We have found it preferable to keep the iron separate, as it precipitates in the presence of peptone.

TABLE SHOWING ESCULIN REACTIONS WITH VARIOUS SPECIES.

Species	Number of strains tested	Reaction with bile salt present	Reaction with bile salt absent	Color
B. coli Group				
B. communior A_1*	5	+	+	black
" A_2	5	+	+	"
" B	2	+	+	"
" C	3	+	+	"
B. communis A	2	+	+	"
" B	2	+	+	"
" C	1	+	+	"
B. aerogenes A_1	3	+	+	"
" A_2	2	+	+	"
" A_3	2	+	+	"
" B	1	+	+	"
" B^2	2	+	+	"
B. acidi-lactici A_1	1	+	+	"
" A_2	1	+	+	"
" B	9	+	+	"
Str. pyogenes	3	+	+	"
Str. salivarius	1	+	+	"
M. pyogenes aureus	1	+	+	"
B. pneumoniae (Friedlander's pneumococcus)	1	+	+	"
B. ———(liquifier)	4	+	+	"
B. salmoneum	1	—	+	brown
B. arborescens	1	—	+	"
B. fluorescens liquifaciens	2	—	+	blue-black
B. pyocyaneus	2	—	?	"
B. enteritidis	1	—	?	brown
B. vulgaris	1	—	+	blue-black
B. cloacae	1	—	+	brown-black
B. sporogenes	6	—	+	"
B. Welchii (Alpha)	3	—	—	unchanged
" (Beta)	1	—	—	"
B. dysenteriae (Jurgens)	1	—	—	"
B. dysenteriae (Kruse)	1	—	—	"
B. dysenteriae (Shiga)	1	—	—	"
B. paratyphi (Beta)	1	—	—	"
B. typhi	9	—	—	turbid white
B. alkaligenes	1	—	—	"
B. Zenkeri	1	—	—	unchanged
B. prodigiosus	1	—	—	"
B. ruber	1	—	—	"
B. erythrogenes	1	—	—	"
B. Havaniensis	1	—	—	"
Sarc. lutea	1	—	—	"
B. icteroides	1	—	—	"
B. violaceus (Berolinensis)	1	—	—	"
M. ureae	1	—	—	"
Str. equinus	1	—	—	"
Str. lacticus	1	—	—	"

*Two unclassified forms, one chromogenic, the other a liquefer, which otherwise correspond with *B. communior*, give the esculin test.

Of the above mentioned species Harrison and Van der Leck tested with bile-salt present and found similar results with the following:

B. communis, *B. aerogenes*—positive reaction.

B. fluorescens liquifaciens, *B. vulgaris*, *B. cloacae*, *B. Zenkeri* and *B. prodigiosus*—negative reaction.

They also mention the following additional forms as giving a negative reaction:

B. fluorescens, *B. lactis viscosus*, *B. butyricus*, *B. mesentericus*, *B. mycoides*, lactic acid bacteria (5 species), slimy milk bacteria (3 species).

It is at once apparent that the addition of bile salt plays an important part in the test, since in the absence of bile salt, a number of species give a brown to black color, and sometimes a dark precipitate which would render the test uncertain.

Even with the bile salt present several species give the test which do not produce gas in sugar media and are not related to the *B. coli* group. *Str. pyogenes*, isolated from horse feces, from the tonsils in a case of tonsillitis and from milk, *Str. salivarius* from sore throat, *M. pyogenes aureus* from tonsillitis, Friedlander's pneumococcus, and an unidentified liquefier from water supply. The latter species was found in routine examination of a water supply at times when no gas-former was present. It is a facultative anaerobic, motile bacillus, producing positive results with esculin, giving the indol reaction, reduction of nitrate to nitrite, acidity on litmus lactose agar, and coagulation of milk with acid reaction. It produces a small amount of gas in liver broth* but no gas in dextrose or lactose broths.

Hence the test cannot be relied upon to prove the presence of *B. coli* in presumptive routine work. It is valuable, however, as a additional test in the identification of specific forms; for example, probably all members of the *B. coli* group, as classified by D. D. Jackson,† respond to the test, but *B. typhi* (nine strains from a wide variety of sources, European and American), *B. paratyphi* B, and *B. dysenteriae*. (Jurgens, Shiga, and Kruse) do not give the test.

The delicacy of the test, as compared with lactose bile, was tried by planting a sufficient number of dilutions, by tenths, of a pure culture of *B. coli* in both media until a negative test was reached. Both media gave a positive test in the same dilution (1–10,000,000 cc.). A comparison was then made in a similar manner with an infusion of horse feces. In this test the esculin was positive in 1–10 cc. in twenty-four hours, 1–10,000 cc.

* Jour. Infect. Dis., Vol. VIII, 1911, pp. 289–294. Presented at Convention of Am. Pub. Health Association, 1909.

† Jour. Infect. Dis., Vol. VIII, 1911, pp. 241–249. Presented at Convention of Am. Pub. Health Association, 1910.

in forty-eight hours, and the lactose bile was positive in 1–100,000 cc. in twenty-four hours, and in 1–1,000,000 cc. in forty-eight hours. In another series with infusion of horse feces, the esculin was positive several dilutions beyond the lactose bile, due to the production of a positive test by *Str. pyogenes*. Indeed, this experiment lead to the discovery of such effect by *Str. pyogenes*. In the same manner, in two series comparing milk, and a series comparing sewage, the esculin and lactose bile gave positive results in the same dilutions.

Hence it may be safely stated that in delicacy of reaction the esculin and lactose bile tests are about equal. The esculin test does not appear uniformly in twenty-four hours. All tests were allowed to continue for from four to five days.

CONCLUSIONS.

1. Sodium glycocholate should be retained in the formula, since the color reaction is more definite, and is given by fewer species.

2. In delicacy of reaction the esculin test is about equal to the lactose bile.

3. The esculin test cannot be relied upon as a *presumptive* test for *B. coli*, since positive results may be produced by at least five species which are not gas-formers.

4. The esculin test is, however, very valuable as an additional confirmatory test in the identification of species, since, for instance, it makes a sharp distinction between the *B. coli* group, on the one hand, and *B. typhi*, *B. paratyphi*, and *B. dysenteriae*, on the other hand.

The Massachusetts Association of Boards of Health

OCTOBER—QUARTERLY MEETING
Boston, Massachusetts

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, on Thursday, October 19, 1911, Dr. Henry P. Walcott, President, presiding.

On recommendation of the Executive Committee the following persons were elected to membership in the Association:

Dr. L. R. BURNETT, Board of Health, Milton.
Mr. W. C. TUCKER, Inspector of Milk, Milton.
Dr. E. M. BRASTOW, Inspector of Animals, Wrentham.
Dr. F. G. BARNUM, Board of Health, Hyde Park.

REPORT OF COMMITTEE ON MILK LEGISLATION.

There were eighteen bills relating to milk before the last session of the legislature. Of these, three survived and were placed upon the statute books, while the other fifteen were rejected.

Your committee did some work in support of these three new laws which are: An act relative to the establishing of milk distributing stations in cities and certain towns; an act to authorize the incorporation of medical milk commissions; and an act relative to the labeling of evaporated, concentrated, or condensed milk.

House Bills 350 and 1332 were the most important of the Bills that failed to pass. House Bill 350 was recommended by the State Board of Agriculture, and easily passed both branches of the legislature, but was vetoed by the governor. A strong but unsuccessful effort was made to override the veto. This Bill, if enacted, would have legalized the milk regulations of local boards of health, which, in the opinion of some, is made necessary by a recent decision of the Massachusetts Supreme Court. House Bill 1332 was presented by the Massachusetts Milk Consumers' Association, and was later amended, becoming No. 1943, better known as the Ellis bill.

The Milk Consumers' Association Bill, as first drawn, was viewed with some concern by your committee, since it could be interpreted as depriving local boards of health of their right to supervise the milk supplies of the communities whose health they were charged with safeguarding. After

several conferences with the Executive Committee of the Milk Consumers' Association their Bill was modified, and your committee withdrew opposition to it. The Bill was finally vetoed.

Your committee recommends that at the next session of the legislature, there be introduced and supported some such bill as House Bill 350 of the last session, which read:

"The board of health of any city or town in this commonwealth is authorized to issue permits for all milk or cream received, held, kept, offered for sale, or sold in said city or town and subject to such conditions as it may make; and to forbid the sale of any milk or cream produced, transported, or kept under conditions not approved by the said board of health."

(Signed), GEO. E. BOLLING, Chairman.

On motion of Dr. Durgin, the report was accepted and the recommendation adopted.

THE LABORATORY DIAGNOSIS OF GLANDERS.

By B. L. ARMS, M. D.,
Director, Bacteriological Laboratory, Boston Board of Health.

Glanders exists in nearly all parts of the civilized world, but is most common in the temperate zone where a more active traffic in horses exists. This is one of the oldest known diseases of horses. It was known to Aristotle and Hippocrates. The Roman authors Apsyrtus and Vegetius described glanders, the latter recognizing several varieties, especially that of the nose and skin. Its infectiousness was recognized as early as the seventeenth century. Solleysel, in 1664, supposed it could be transmitted by the air, and Van Helmont, in 1682, considered it to be identical with human syphilis. As early as 1734 Saunier gave precise directions for disinfecting stables. Garsault, in 1741, and Bourgelat, in 1764, recommended the immediate slaughter of horses suffering from glanders, and the segregation of suspected animals.

The causative agent of the disease, *Bacillus mallei*, was first accurately described by Loeffler and Schutz in 1882, when they isolated from glandered horses the organisms which fulfilled all of Koch's postulates. The organism is a bacillus which grows in the presence of oxygen and produces a characteristic growth on potato, a so-called honey-like growth, in thirty-six to forty-eight hours at body temperature.

Mallein was produced and investigated in 1891 by Kalning and Hellmann, and was the first extensive laboratory aid to the diagnosis of glanders, although the method of Strauss slightly antedates it. Mallein is a liquid prepared by growing *B. mallei* in glycerine broth for six to eight weeks, after which the organisms are killed by boiling, and carbolic acid added as a preservative; the product after filtering, bottling and sterilizing, is ready for use.

Strauss,* in 1886, discovered that when material containing virulent *B. mallei* was injected into the peritoneal cavity of a male guinea-pig, scrotal lesions developed, and since the publication of his article in 1889 the test which bears his name has been quite generally used. In making this test, material from the suspected lesions is secured, usually on sterile swabs, and sent to the laboratory, where it is moistened with sterile water or salt solution, and inoculated into male pigs, those weighing at least 500 grams being preferred. It is customary to use two pigs for each case, giving one twice as much of the suspension as the other, in order to obtain

* Strauss: Compt. Rend. Acad. d. S 1889, 108 p. 530.

the diagnosis as soon as possible. A culture from the swabs is also made, for it sometimes occurs that a positive result is obtained in this way when the pigs are negative, although, before a positive diagnosis is returned, organisms obtained in this manner are always proved by inoculation into pigs and the production therefrom of typical lesions. The scrotal lesions in the guinea-pig develop in from two to five days in the great majority of cases, but may be considerably delayed. In these delayed cases we frequently find lesions in other places, as in the omentum, glands and at the inoculation site; consequently careful autopsies are made on all such animals.

Agglutination tests were next introduced and there have been many methods of performing these tests. The microscopic test is made in practically the same way as the Widal test but it is very little used and has never been extensively employed. Macroscopic agglutination tests have been more reliable and there is a constant gain in their reliability.

An early method was to grow *B. mallei* in broth containing the serum to be tested; if this was from an animal with glanders, flakes, composed of bacilli which had agglutinated, would settle to the bottom, while if the serum was from a normal animal no flakes would be found.

A later method was to add *B. mallei* to tubes of serum diluted to strengths varying from 1–50 to 1–5000, these were then incubated from ten to fifteen minutes at 37°C. and examined. The reaction was considered typical when the higher dilutions were clear, with a precipitate of bacteria in the bottom of the tube, while in a negative reaction the fluid was uniformly cloudy.

Following this method came the precipitation test of Dr. D. Konew, Director of the Bacteriological Laboratory in the Veterinary Institute of Charkow, Russia. He introduced a test fluid named malleasa which was made by dissolving a 48° hour agar growth of *B. mallei* with an eight per cent. solution of antiformin, and using a solution saturated with *B. mallei*. As this solution is strongly alkaline it is neutralized with five per cent. sulphuric acid and then filtered, first through filter paper and then through a Berkefeld filter, in order that the resulting fluid may be homogeneous without any undissolved bacilli being present. In performing the test 1 cc. of the malleasa is put into a test tube of small diameter and 1 cc. of the serum to be tested is allowed to run slowly into the bottom of the tube through a capillary pipette, and being heavier than the malleasa, it remains at the bottom of the tube, while the test fluid is forced up. A positive reaction occurs when, at the junction of the two fluids, a whitish ring is formed, similar to the ring in Heller's test for albumen. Needless to say no ring occurs in a negative reaction.

The latest and most satisfactory agglutination test is made by the use of the centrifuge; in this the test fluid consists of an emulsion of *B. mallei*

grown on glycerine agar for from thirty-six to forty-eight hours, then heated for two hours at 60°C. to kill the organisms. The bacilli are then washed from the surface of the agar with sterile salt solution containing a five-tenths per cent. carbolic acid. This suspension of killed bacilli is brought to a standard density and after being kept for about two weeks in the ice chest is ready for use. The fluid should be made from a mixture of eight to ten strains of *B. mallei* in order to produce the best results.

The serum to be tested is diluted in test tubes with the carbolized salt solution, the dilutions ranging from 1–300 to 1–8000; these tubes are then centrifugalized at 1600 revolutions per minute for ten minutes and allowed to stand for an hour and half, when the findings are read. The appearance of a veil-like clumping at the bottom of the tube, with the upper part of the fluid clear, indicates an agglutination, while the collecting of a dense white precipitate at the bottom of the tube, with a cloudiness in the supernatant fluid, indicates a negative reaction.

The latest method for the diagnosis of glanders is known as the complement fixation test. In this the principles of the Wasserman reaction were first employed by Schutz and Schubert, who published the results of their work in 1909†. It is a well-known fact that if the red corpuscles of one animal are inoculated into an animal of a different species, the serum of the inoculated animal acquires the property of dissolving the red corpuscles of the former. The process is rather complicated but extremely interesting. The necessary ingredients for the test are an immune serum or amboceptor, an extract of *B. mallei* or antigen, some guinea-pig serum or complement, some sheep corpuscles, and the serum of the animal to be tested.

The preparation of the immune serum is the first step; this is procured by inoculating a rabbit with washed sheep corpuscles, giving three inoculations at intervals of a week. Five or six days after the third injection, a small amount of blood is drawn and the strength of the serum is determined. As there is a great variation in the strength of the serum from different rabbits, it is safer to carry two or three along at the same time. If the serum will cause hemolysis when diluted 2000–4000 times, it is ready for use. From 10 to 15 cc. of blood may be drawn from the rabbit, under sterile conditions, and put into the ice chest to allow the serum to separate from the clot, after which it may be carbolized and bottled in small amounts. These bottles should be securely sealed in order that the serum may be kept for some time, since very minute quantities are used for a test. To ascertain the hemolysing strength, the serum is diluted with salt solution in a series of tubes ranging from 1–100 to 1–4000, and the highest

† Schutz & Schubert, Archiv fur Wissenschaftliche und Praktische Tierheilkunde, Band 35, Heft 1-2, pp. 44–83, 1909.

dilution in which there is complete hemolysis represents the titre of the serum tested. In the test the serum is used at double the ascertained strength. The titre remains stationary for three or four weeks.

The antigen, or glanders bacilli extract, is prepared by growing the organisms on agar for from twenty-four to forty-eight hours at 37°C.; these are then washed off the surface of the agar with sterile salt solution and the resulting fluid is heated at 60°C. for four hours to kill the bacilli. It is then put into a shaking machine and shaken continuously for four days.

The fluid is next placed in centrifuge tubes and centrifugalized for two hours at a speed of 2500–3000 revolutions per minute; at the end of this centrifugalization, ten per cent. of a five per cent. carbolic acid solution is added and the material bottled for use. The strength is established by titration and for the test one-half the established strength is used.

The complement is obtained from a guinea-pig and must be not over two days old. The blood may be drawn from the heart of a guinea-pig with a syringe, or a pig may be anesthetized and bled. If the former method is used, 6 to 8 cc. may be obtained from a good sized pig, while if the pig is killed he will furnish from 12 to 15 cc. The serum is allowed to separate from the clot and may be poured or pipetted off, and as there is a great variation in the strength of the serum from different pigs, it must be titrated each time.

In all steps great care must be taken to use exact quantities of the materials to be tested, as otherwise the entire day's work may be lost.

The corpuscles of a sheep may be obtained, either by keeping a sheep on hand to supply them as needed, or they may be obtained from an abattoir whenever the test is to be made.

Blood is drawn from the animal to be tested by opening a superficial vessel under aseptic precautions, and drawing from two to three ounces of blood, which is allowed to separate, the serum being the portion used for the test. This serum must be inactivated by heating to 58°C. for thirty minutes and it is better to follow this by fifteen minutes at 59°C. In case the blood is from a mule it should be heated to a slightly higher temperature.

Dilutions are made of the various ingredients according to the titrations, and except when in use they should be kept in the ice chest; these are the immune serum, the glanders bacilli extract, the guinea-pig serum, a five per cent. suspension of sheep corpuscles, and, without dilution, the sera to be tested. In the test, when immune serum, glanders bacilli extract, guinea-pig serum, and sheep corpuscles, are referred to, the reference is to these dilutions. For each serum four tubes are used, the first and third for the test, and the second and fourth as controls. Into each of the first and third tubes is put 1 cc. salt solution and 2 cc. into each of the

second and fourth; of the serum to be tested 1 cc. is next put into each of the first two tubes, and 2 cc. into each of the last two. Of the glanders bacilli extract, 1 cc. is now put into the first and third tubes, and 1 cc. of the guinea-pig serum is added to each of the tubes. After shaking, the tubes are placed in the incubator at 37°C. for an hour, in order to anchor the antigen and the glanders immune body in which the complement will become firmly fixed, if the serum to be tested is from an animal infected with glanders. After this short incubation the tubes are ready for the final step, which consists of the addition to each tube of 1 cc. of the immune serum and 1 cc. of the sheep corpuscles. Each tube is thoroughly shaken, and placed in the incubator at 37°C. for ten hours, when the final results are observed.

In case the serum tested is from an infected animal, the corpuscles will be found at the bottom of the first and third tubes, while the second and fourth will show dissolution of the corpuscles and the fluid will be colored by the hemoglobin set free. In negative cases all four tubes will show complete hemolysis.

In making these tests each step must be controlled, and accordingly each time tests are made a known positive blood is run and a known negative. In addition to these each different stage is controlled thus:—a tube corresponding to the first tube is run without the horse serum, all other ingredients being the same; a tube with 2 cc. of the glanders bacilli extract and 1 cc. each of the guinea-pig serum, immune serum and sheep corpuscles; another tube containing salt solution, guinea-pig serum, immune serum and sheep corpuscles; another with salt solution, guinea-pig serum and corpuscles; one with salt solution, immune serum and corpuscles, and finally, one with salt solution and corpuscles only. It will be readily seen that failure to faithfully carry out any step will be shown by the controls and the cause of the trouble thus determined.

The fact that this test is made from the blood makes it an extremely valuable one, especially in those cases in which the lesions are deep seated and also in cases of a mixed infection.

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DISCUSSION.

DR. ADOLPH EICHORN. Dr. Arms has selected a subject which is of great importance, not only to the professional men who are directly concerned in the prevention and treatment of animal diseases, but likewise to those who are interested in diseases of human beings. Glanders, primarily a disease of solipeds, is nevertheless communicable to man, and that he does suffer from it with comparative frequency is proven by the cases which occur at intervals in various parts of the country. Only about two weeks ago I was informed of the death of a somewhat prominent Connecticut veterinarian who had become infected with glanders while handling horses. In Washington we had two cases of glanders in human beings during the past year. Furthermore, I believe there are many cases of glanders occurring in human beings which are not so diagnosed, probably because very little thought has been given to this disease in man. The diagnosis of glanders has always been more or less difficult because no method was available by which the cases, particularly the ones which were atypical clinically, could be diagnosed with a degree of certainty.

Up to about a year or two ago we considered the mallein test as the best at our command for diagnosing the disease; it was known to veterinarians that the application of mallein did not always give correct results. Cases of glanders sometimes failed to react; and typical or anti-typical reactions were sometimes secured from horses which were not affected with glanders. Therefore when a method was discovered by which glanders could be more accurately diagnosed, it was considered a great step toward the control and eradication of this disease. This method, as Dr. Arms mentioned, is the complement fixation test, which is practically identical with the biological test used for the diagnosis of syphilis. A positive reaction is always considered an indication of syphilis, and the same rule also applies in the application of the test to glanders: a positive reaction means glanders infection, as the results are not affected by the presence of any other disease.

In Washington, up to the present time, we have tested 1540 cases sent from different parts of the country, and the results are very gratifying. We found that the autopsies performed by inspectors of the Bureau of Animal Industry in Washington and in different parts of the country, on suspected glanders cases in which a complement fixation was obtained, invariably showed the presence of the disease. The lesions were characteristic, and in many cases their character was demonstrated both by bacteriological and histological examinations. The application of this

test, of course, will always remain confined to properly equipped laboratories; but this will not cause any difficulty, because the blood serum can be readily obtained from any number of suspected or exposed horses and sent to the laboratory, where a great number of tests can be made, since five, ten, or even twenty tests can be made in practically the same length of time as one. It is essential to obtain satisfactory clear serum for the test. To accomplish this, the blood is drawn from the jugular vein of the horse to be tested, with the ordinary precautions. The serum is then allowed to separate from the clot in a cool, dark place, and is forwarded to the laboratory either in the original container, or the serum is poured off from the clot into another vessel, wherein it is forwarded for the examination.

The control and probably eradication of glanders by this test could be readily carried into effect if the official German method of testing all the horses in a stable where glanders is found, could be carried out. Blood is drawn from every horse and subjected to the complement fixation test. Those horses which give a positive reaction are slaughtered. The remaining horses are retested in about two weeks, for any of the animals in the stable which were in the incubation stage on the first test, will probably react at the second test. If all animals prove free on the second test then the stable is considered free of the disease. It may be possible to induce communities that are anxious to eradicate glanders to adopt the German procedure and compel the application of the complement fixation test on all horses within the town or city limits, for it is reasonably certain that the disease could be eliminated if this were done, if at the same time it were required that all horses brought into the community be subjected to the test.

The test is specific, as a specific organism, the glanders bacillus, is used against specific anti-bodies or immune bodies which are present in the horse, and only against such immune bodies will the glanders antigen prove effective. A fixation will not take place in the presence of any other immune body than that of glanders. In the laboratory of the Bureau of Animal Industry we have taken serum from horses afflicted with all kinds of diseases and tested them against the glanders antigen. In no instance did we find that the horse serum which originated from other diseases than glanders fixed the complement. That is, we obtained hemolysis in all instances, which shows that the test is specific; accordingly, a fixation of the complement is a certain proof of glanders.

The Board of Health in Boston certainly should be complimented and congratulated that it has taken up this work immediately after the Bureau of Animal Industry proved its reliability. The work, of course,

will have to be extended, and not only the clinical cases which give the reaction should be destroyed, but all cases which give a positive complement fixation test should be slaughtered. Only by this method will it be possible to control the disease. It is known that not only the clinical cases of glanders are dangerous, but that the occult and latent cases are also, because in the clinical cases the owner and the veterinarian may suspect the disease by the symptoms which are present in the animal, whereas the animal suffering with an occult or latent case of glanders may be in prime condition, yet daily expel glanders bacilli in great numbers. The nodules which are invariably present in the lungs of an infected animal may communicate with bronchi, and of course in such instances whenever the animal coughs numerous bacilli are expelled, and thus the infection is constantly disseminated. Therefore, the work of destruction should not be confined to the clinical cases, but be extended to the occult cases of glanders.

A SUMMARY OF MILK REGULATIONS IN THE UNITED STATES.*

By EDWIN HENRY SCHORER, M. D.,
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Customs and rules and regulations concerning milk have been established either by the consumer or the government for many years. At this we wonder little, if we take into consideration the important part milk and its products play in our food. The laws of the old Egyptians, the Mosaic, and the Roman laws, concerned foods generally. Venice was probably the first city to make specific regulations concerning milk, since in 1599 it passed regulations regarding an epidemic occurring in milk-producing animals. It was not, however, until chemists established accurate methods of milk analysis, that our more modern regulations appeared. Hamburg, in 1818, was the first city to establish police regulations concerning the abuses of the milk trade. This type of regulation still exists, and in many places is the only kind of regulation considered necessary. However, overlapping the period of such legislation, is another and more important period which is characterized by the attempt to so regulate the production, delivery, and consumption of milk that it will not be deleterious to the health of the consumer. To accomplish this purpose the medical profession has tried to suitably modify milk, and health officials have undertaken the more important work of enforcing the production of milk that is clean, and free from disease-producing elements. There is a growing realization of the fact that while watering, skimming, or in any way reducing the food value of milk, is fraud or theft, still these practices do not menace health; whereas cows suffering from diseases communicable to man through milk, and milk infected with the specific micro-organisms of disease, or milk wherein bacteria have multiplied enormously, must be considered as definite health problems.

The existing official regulations are of great importance, and exhibit many fundamental problems. It must be decided whether there should be uniform regulations extendingover a whole country, or a whole state, or whether the regulations should be purely local, and it must be determined whether the regulations ought to guard against fraud, or against disease,

* Preliminary Report.

† Milk research fellowship established and supported by the Milk and Baby Hygiene Association of Boston.

or against both. Moreover, it is important to find out the best requirements, and methods of regulation necessary to secure proper protection.

During the past two months I have made an effort to secure from each state and from cities of over 50,000 population, answers to questions on these points, and I have also tried to get from them copies of regulations concerning their milk supply. Questions were asked to ascertain what requirements are regarded as most important, as well as to obtain certain information not ordinarily included in reports and regulations. In order that the questions might be answered by the proper officials, the letters were sent to the governors of states and mayors of cities, who were asked to refer them to the proper officials. Up to October 16, thirty-one state officials have sent in complete returns, and the officials of seventy-five out of one hundred and nine cities of over 50,000 population, have responded. It was found that in many cities, officials have tests and standards not prescribed by ordinance or rule. Because this is only a preliminary report, and not yet complete, many of the details must be omitted, and only a few special points brought out.

The standards of eleven states are the same as those of the United States as prescribed by the Secretary of the Department of Agriculture. So far, three states have reported that they have no regulations. The question was asked whether at present a high uniform standard for the state was favored; the officials of two states answered that they had a fat requirement of only three per cent., and two officials in states using the United States standard, wrote that higher uniform standards could not be enforced and would be detrimental. An official from a southern state wrote, "these matters ought to be left to the municipality." All the states having milk regulations require that milk for human consumption shall be drawn from healthy cows only. In many states it is evident that this regulation is merely a copy of the United States standard. Only two state officials who reported to me, definitely stated that they require the tuberculin test. The whole milk question for the state is usually taken care of by the board of health, or by the agricultural department, which is often connected with the agricultural college of the state. In one state the matter is left with the county attorney who can require the chemist of the state agricultural college to make analyses. Whenever a state has a laboratory, a chemist is employed to make chemical milk examinations, which emphasizes the importance given to fraud rather than to sanitary requirements. The state laboratories are little used by the cities, except in one state in which all milk work is done in the laboratory of the state. By far the largest number of officials believe they are hindered by lack of

funds and inspectors, but some say jury trials, "shyster" lawyers, etc., are obstacles to efficiency. Many states require a license to sell for direct consumption. In some states the officials must publish the names of persons licensed to sell milk and of those whose milk licenses have been revoked.

The necessity for regulations in regard to milk for dirict consumption is much greater, and more important in the city than in the country. All of the cities, except one, from which reports have so far been received, have officials of their own to handle the milk problem, and nearly all of the cities print their own regulations and ordinances. In comparing state and city regulations, it was found that so far as chemical constituents are concerned, the standards of cities are generally the same as those of the state wherein they are located, but this is not always so for there are some cities with higher and some with lower standards than those prescribed by state law. Exactly what happens when a city has a lower requirement than is set by the government of the state in which it is located, I have not yet learned. It is to be noted that in many cities, even though a specific gravity standard be not set by law or rule, the lactometer reading is used. The standard for butter fat varies in the different states and cities from two and five-tenths to three and seventy-five hundredths per cent. Many cities have farm and local inspection and have bacteriological standards. It was only in 1900 that the first bacteriological standards were established, yet the increasing realization of the importance of standards for sanitary conditions has led to their widespread introduction. Bacteriological standards vary as follows:

Cities of over 100,000 Pop.				Cities between 50,000 and 100,000 Pop.			
1 city	= less than	50,000	per cc.	2 cities	= 100,000	per cc.	
2 cities	= "	100,000	"	1 city	= 200,000	"	
1 city	= "	200,000	"	2 cities	= 300,000	"	
2 cities	= "	250,000	"	11 cities	= 500,000	"	
1 city	= "	300,000	"				
9 cities	= "	500,000	"				

In addition to the above, two cities notify the producer if the bacterial count is over 500,000 per cc.; one city encourages the producer when counts are below 100,000 per cc. and reprimands him when they run over 500,000 per cc.; one city inspects the farms and dairy methods when the counts rise above 100,000 per cc. The bacterial standards of one city vary with the kind of milk; thus raw milk must not contain over 250,000 bacteria per cc., pasteurized milk not over 50,000 per cc., and cream must contain less than 500,000 per cc. Of the seventy-five city officials who have so far responded to my questions thirty-seven of them give more or less attention to bacterial counts.

Both state and city regulations require that milk must come from healthy animals kept under sanitary conditions. The returns from five cities show that the tuberculin test is used to diagnose tuberculosis, and milk from reacting animals is excluded from these cities. One city by its rules excludes milk from reacting cows, but the state legislature has prohibited this regulation. Two cities have regulations which can exclude milk from reacting animals, while in the regulations of one city the method of diagnosis of tuberculosis is specifically defined as "according to the recognized physical signs and symptoms of bovine tuberculosis." A number of officials wrote that new ordinances now under way will include the tuberculin test and some other officials feel the test is badly needed in their regulations.

In the answers to the question, "On what test or tests do you accept or reject milk?" it was found that the Babcock butter fat test is the most universally used by city officials; next in importance are specific gravity, solids (calculated or determined) and counts of bacteria per cubic centimeter. Of the tests made on the street the temperature test is most frequently used and the maximum temperature at which milk may be kept varies from 45° F. to 70° F. in the different cities. Next in frequency of use as a street test is the specific gravity determination, which, as stated before, is very often not mentioned in ordinances or printed rules. Examination of milk for visible or determinable sediment or dirt is also frequently used as a street test.

Of tests giving results early enough to prevent the sale and consumption of milk below standard, lactometer readings, inspection, temperature, and detection of dirt, are the most frequently used. Officials of about one half the cities stated they make no tests that give results early enough to prevent the sale and consumption of milk found below standard.

Only two cities prohibit the sale of skimmed milk but in nearly all of the cities it must be labeled "Skimmed Milk". A few cities have no regulations in regard to cream; in those that have regulations the butter fat requirement varies from twelve to forty per cent. In one city it must be labeled "whipping cream" or "coffee cream." Relatively few cities have bacterial standards for cream.

Information was also sought in regard to the number of farms supplying each city, the greatest and average distance milk is brought, and what percentage is within wagon haul; what processes were used to pasteurize the milk and what percentage of the total milk supply was pasteurized. The replies are tabulated in such a manner as to show the greatest variations:

	Cities over 100,000	Cities 50,000 to 100,000
Number of farms supplying the city	135 to 44,000	35 to 1,000
Greatest distance	10 to 425 miles	10 to 70 miles
Average distance	5 to 250 miles	3 to 50 miles
Percentage within wagon haul	Less than 1% to 90%	All (9 cities) to 40%
Percentage pasteurized	None to 75%	None to 50%

The method of pasteurization varies in the different cities. In some the flash method is used entirely, while in others the holding method is used entirely, but in almost all cities, where a large part of the supply is pasteurized, both methods are used. In one city an electrical process is employed and is claimed to be efficient. The efficiency is probably due to the temperature to which the milk is heated during the process.

For the general supply, milk is retailed at an average price of eight cents per quart, although the price varies from six to fifteen cents in the different cities. Certified milk varies in price from ten to twenty cents per quart. Except when he delivers his own milk, the producer receives from one-third to one-half the price paid by the consumer.

The methods followed in different cities to protect against fraud and to furnish clean milk vary a great deal. Three important methods are used to enforce regulations: fines are imposed; licenses and permits to produce milk for sale or to sell are refused or revoked; or the milk is destroyed. Most cities impose fines, as well as resort to the other methods mentioned. In many cities only the seller or dealer is fined, and the producer is penalized by either refusing admission to the city of such of his milk as is below grade, or by destroying it. A few cities impose no fines but revoke permits and destroy milk below standard. The method of destroying milk varies; in some cities it is returned to the farm, in others it is poured into the sewer, and in one city a red dye is added to milk found above a certain temperature. Fines are most frequently imposed for failure to meet the chemical standards or for adulteration, while warning and exclusion of milk produced under insanitary conditions follow inspection and high bacterial counts. In some cities if milk is adulterated the ordinances require imprisonment of the offender for the second and subsequent offences; in one city the third offence of this kind results in the permit to sell milk being revoked for one year.

Of the cities from which returns have so far been received, thirty-eight have special milk for infant feeding. In a number of these cities such milk is furnished only during the summer months. In three cities this supply is under the management of the board of health, while in sixteen

cities charitable organizations furnish special milk for children. There are Walker-Gordon laboratories in eight of these cities, and in fifteen others private dealers furnish special milk for infant feeding. The returns from five cities having such milk do not state who is supplying it.

Officials of about one-half the cities wrote that they lack sufficient funds and inspectors; this complaint was less frequent in southern than in northern and western cities. While lack of funds and inspectors are the most frequent obstacles to efficiency, complaint is made that low-standard lawyers, the opposition of the courts and especially shown in jury trials make law enforcement difficult. An official of one city reported that it takes one-half of the energies and time of his department to fight so-called reform legislation of a sort not needed and of a kind designed to give someone an undue trade advantage. Officials of several cities of the southwest consider that the cattle in that part of the country at the present time are unsuited to the production of milk. One of my questions read as follows: "Whom do you find more reliable, the large dealer or the small selling producer?" In answering this question the officials in most cities seemed to favor the large producer. A reason given for this was that the large dealer can control his business more easily and that he has a large amount of capital at stake. This opinion, however, is not universally held, for an official in a southern city stated that "they are all scoundrels."

Before a supply of general good honest milk can be obtained it will be necessary to have proper legislation. Realizing that there is no other subject concerning which so much legislation is attempted that at the present time, the producer, dealer, and consumer are at a loss as to what will be proposed next. To solve the questions involved, doctors, lawyers, economists, veterinarians, and experts of all kinds, are called in. The opinions of these men vary even on the same question, nor can their opinion be said to have the same object in view—that is, honest, clean, healthful milk. There is also much conflict in selecting the proper body in which shall be vested the right to regulate and control the milk supply. This at times leads to the establishment of different requirements and regulations in the same territory.

Because the milk question is so complicated, and there are so many different views concerning standards and requirements, it seems to me that one of the best methods of solving the problem is to review and study the methods now employed in the various parts of the country. While the laws and rules vary a great deal, they contain features that stand out most prominently as being efficient; and the mere fact that they vary so much is evidence that uniform requirements are not feasible at this time. A study of the regulations shows at least one good method which will open

the way for suggestions leading to a satisfactory solution of the problem. It is certain that our federal government should not regulate the percentage of butter fat in milk or establish other chemical standards. Even in the small area of a state this seems inadvisable. This objection to such standards is valid because of the advantage of using different breeds of cattle in different sections of the country, and because of differences in feed, market, etc. However, local conditions need not prevent state-wide regulation concerning the health and care of the herd, methods of milking, cooling, and all conditions affecting milk up to the time it reaches the place of consumption, or manufacture into other products. The states should adopt the score card system and should license. Each license ought to state whether the milk is suitable for direct consumption, for cheese or for butter making, or for other purposes. These licenses and scores should be published. This will leave with local health boards, as far as milk for direct consumption is concerned, the establishment of standards of percentages of butter fat, solids, and all such chemical constituents as may be desirable, as well as the regulations concerning pasteurization, labeling, standards for cream and skimmed milk, and local sanitary conditions. Then if these regulations are too lax or too stringent the result will be felt in the locality which can most readily change its laws.

DISCUSSION.

MR. GEORGE E. BOLLING (Brockton). I have listened with considerable interest to Dr. Schorer's paper, but the only part I feel warranted in commenting on is that relating to the regulations existing in Massachusetts.

A year and nine months ago the Committee on Milk Legislation reported to this Association a set of milk regulations suitable for adoption by both town and city boards of health in Massachusetts. Copies of these regulations were sent to all local boards of health in the state in the hope that a general adoption of such regulations would insure a uniformity that would be of benefit to both health officials and milk dealers. How extensively the regulations, either in whole or in part, have been adopted I cannot say, but I do know that where they have been used, considerable good work has been accomplished, and that no difficulty has been experienced in securing convictions in court for the sale of dirty milk when such a course was deemed necessary. These regulations, backed up by such statute laws as Chapters 405 and 443 of the Acts of 1909, should enable local boards of health in this state to provide a safe milk supply for their respective communities.

I wish to call to the attention of this Association a matter which can very properly be brought up in connection with the discussion of this paper, and that is that there is another phase of board of health work necessary to minimize infant mortality beside the mere making and enforcement of milk regulations, and that phase is the education of the family in the proper care of clean milk after it is left at the door.

In my city, Brockton, we have had sanitary inspection of milk for over five years, and throughout that time we have found milk dealers who were selling ultra clean milk, as market milk goes; dealers who were finishing with an average of below 10,000 bacteria per cubic centimeter as shown by our examinations; and one dealer who for five years has marketed a product averaging but 14,000 bacteria to the cubic centimeter for that period. But death of infants occasionally would occur in families supplied with even this milk. As a consequence the Brockton Board of Health realized that another step was necessary—the teaching of parents the proper care of milk in the home. This seemed a delicate matter to handle, but a four-page circular was drawn up and sent to every home from which a birth was reported. Two pages were devoted to the care and feeding of the infant, one page to the proper care of milk in the home, and the last page was a reprint of the article "Beware of Flies," authorized by this Association. These circulars were first sent out last summer, and while it may be merely a coincidence, we believe the extremely low infant

mortality in Brockton the past summer is due in large part to their influence.

Deaths of infants became so rare that when our local board's weekly reports were received by the State Board of Health they felt impelled to inquire if some mistake had not been made in compiling the reports, but they were met with the assurance that the reports were correct as rendered.

MR. ELLIS. I would like to ask Dr. Schorer how he arrived at the conclusion that it is unwise for the state to establish a chemical standard, and why he believes that it should be a local rather than a state regulation.

DR. SCHORER. The area of some states is so large that the kind of cattle may be entirely different in the different sections of the state. Again, what would be all right for the state of Massachusetts, where most milk goes to direct consumption, would not be right in a state like Wisconsin, where a relatively small amount of the milk produced goes to direct consumption. It would not be necessary to require 3.25 per cent. of fat when 80 per cent. of the milk is used for cheese making. I base my conclusions to some extent on the experience of Germany. In 1882 the attempt was made to establish regulations for all Germany, but it was decided that conditions varied so in different sections in the country that national standards were not advisable. However, in the last year the producers' association asked that the country make sanitary regulations. The reason for this is, of course, that a number of cities draw from the same part of the country, and the fields of operation of the sanitary inspectors overlap, but the establishment of chemical standards would not lead to confusion of this kind.

DR. DEARING. I hope to see the day when every board of health will have its own bacteriologist and its own methods of making examinations. Bacterial tests are the strongest and best safeguards that the boards of health can possibly secure. In Braintree, three years ago, we appointed a man as bacteriologist and this move has helped to decide questions quickly upon their merits. If we send in our samples to the State Board of Health we possibly wait three or four days, and the delay often causes trouble. The State Board of Health should have absolute authority to stand back of us and see that we get justice, but the local board should be supreme.

I think the Ellis bill would have proved to have been a step in the right direction.

MR. ELLIS. It would seem from the remarks of the gentleman that he thought that the bill which passed the House put the whole control under the State Board of Health, to the exclusion of the powers of the local boards. Section 2 of that bill reads as follows:

"This act and all regulations prepared in accordance with it shall be administered by the State Board of Health, acting through its milk division or other agents, or through the municipal boards of health, or their agents, whom the State Board of Health may constitute its agents for the purposes of this act."

It was intended that the State Board of Health should work through the local boards so far as possible and should secure uniform regulations.

DR. DAVIS. The so called long haul and short haul milk touched on in Dr. Schorer's paper is of importance to all interested in milk. Babies are great milk consumers and so the mortality statistics of infants under one year of age tell an interesting story. During July, New York City, with a population of nearly five million people, had an infant death rate per thousand births of about 133; Rochester, with a population of 300,000, had almost the same infant death rate. New York's milk comes three or four hundred miles; Rochester's milk supply is near at hand, yet the two cities had nearly the same infant death rate. Utica, with a population under 100,000 has an infant death rate of about 155, and Hudson, with a population of only 11,000 and a nearby milk supply, had an infant death rate of 333. It is interesting to see that in some of the small towns infant mortality is considerably higher than in the larger cities.

THE PRESIDENT. Representing the Massachusetts State Board of Health, I should like to say that the constant policy of that board has been to increase to the utmost the responsibility of the local authorities. So far as I know there has never been an attempt to interfere with any community which is offering proper sanitary protection to its people. We will do all that we can to assist those in authority, and when necessary we will interfere; but we wish to emphasize the fact that our first desire is to increase to the utmost the authority of the local boards and to assist them in their legitimate work.

MR. ELLIS. From this bill I did not read all pertaining to the non-interference with the local boards of health. Part of Section 20 reads:

"Nothing in this act shall affect the right now or hereafter possessed by any city or town to regulate its own milk supply by its own inspectors, or to exclude milk from sale in such city or town which it condemns by its own inspectors, provided that such municipal regulations do not conflict with the provisions of this act or of any regulation made hereunder."

That is to say, the local provisions must not be *less* than those of this bill. The local boards can *exceed* them as much as they wish.

(Adjourned.)

Notes and Reviews*

PERSONAL HYGIENE.

By PERCY G. STILES,
Assistant Professor of Physiology in Simmons College.
(*Reviewer.*)

Rightmindedness in Sex Matters. Civilization appears to make men tend toward extremes of conduct and sentiment where the facts of sex are concerned. It is often remarked that the animals set us good examples of sexual temperance, and it is probably true that the simpler races of mankind are likewise sounder and saner in this important field of behavior. We know that in the course of history overemphasis upon the sexual functions has corrupted religions, as their overindulgence has contributed to the ruin of empires. But while these facts are only too familiar, it must be admitted that there is an unwholesome tendency among us to the opposite standard of judgment and practice—the minimizing or even the abhorrence of sex. Such a position results clearly from a recognition of desolating evils which are patent to everyone. The impulses prompting to it are primarily those of virtue but they lead readily to false views.

To defend the place of sex in human feeling and its expression is a task not to be undertaken without first giving explicit limitations. Total abstinence for the unmarried is the ideal. If reasons must be given for a requirement so uncompromising, they may be defined under three heads, as prudential, social, and ethical. The order is an ascending one. The danger of venereal disease constitutes a low but positive motive for continence. A more worthy consideration is found in the thought that every man who indulges himself contributes to the degradation and ultimate misery of outcast womankind. Higher still should be the purpose of the young man to come to his wedding-day with no memories that must move him to self-reproach—with a past as blameless as that of the woman who has put her faith in him.

As to marital relations, this difficult subject has seldom been better treated than it was by H. Newell Martin, in the appendix to "The Human Body." In the recent revision of this splendid text book the chapter

*EDITOR'S NOTE. Readers are urged to send public health notes of interest to the Editor by whom they will be distributed to the proper reviewer. The sender's name or initials should appear under such notes.

stands with little change. It is wisely insisted that the husband must expect to exercise restraint, that he must wait strictly upon the pleasure of his wife, and that he is not to anticipate that her propensities will measure up to his own.

Granting all this, one may still condemn the mistaken attitude that sex is an unworthy thing, and that the ideal of refinement and discipline demands the extinction of its impulses. This was the avowed position of the Shakers. It is tacitly held by a great many people. It is fostered by much that is written and taught. A widely read periodical recently published a woman's account of her own courtship, in the course of which the lovers tried the experiment of denying themselves caresses. Shocked to find how much the physical had counted toward the joy of their engagement, they felt that they ought to end it, and resolutely did so. Such rigorous self-analysis is not common, and it is well that it is not. If it were applied widely the results would be tragic, for it would lead again and again to a distrust of motives and a skepticism regarding the possibility of happiness fatal to successful marriage. The attempt is contrary to nature and to Herbert Spencer's vigorous teaching that the first duty of man is to be a good animal.

Sexual emotion, like any other type, may spend its power destructively, but it may also be a force for good. Observing that it sometimes impels to folly and crime, we fail to realize that, in well-balanced lives, it is a source of patience and fidelity, constancy and devotion. To regard it as necessarily opposed to high thinking is almost equivalent to the claims that fullness of physical health is inimical to culture and goodness. We have come to consider the last as a heresy and we ought to reject the first. Writers like Whitman, who have sung the praise of sexuality, shock the sensibilities of some and are ardently admired by others. To the majority of readers their error seems to be a literary rather than a moral one. They are right in urging that sex is worthy and honorable but its details are as inappropriate for setting forth as those of any other physiological matter. Sex, in the physical realm, lends itself as little to poetry as does vasomotor adjustment or pancreatic secretion. But the fine contribution of sex to chastened human feeling has never been better expressed than by John Boyle O'Reilly when he wrote with delicate directness:

> " . . I send you a cream white rosebud
> With a flush on its petal tips;
> For the love that is purest and sweetest
> Has a kiss of desire on the lips."

EPIDEMIOLOGY AND PREVENTIVE THERAPEUTICS.

By CHAS. V. CHAPIN, M. D.,
Health Officer, Providence, R. I.

Dental Caries as the Cause of Enlarged Tonsils. Gibson, School Medical Officer, County Chester, England,* has made a careful study of the occurrence of enlarged tonsils in connection with carious teeth. He finds that in children with sound teeth 1.82 per cent. have marked enlargement of the tonsils. Those with one to four carious teeth have 3.7 per cent. enlargement, and those with more than four carious teeth have 5.3 per cent. enlargement. After correcting for age and probable error he finds that there is a marked correlation between decayed teeth and enlarged tonsils. He critically considers whether the relation between the two may be due to a common cause, or whether the caries may be caused by the enlarged tonsils, or the enlargement of the tonsils may be due to the decayed teeth. He says that the only common cause that has been suggested is hypothyroidism, but he can find no evidence that this is really a cause. He has studied the relation between rickets and diseased tonsils and teeth, but from a study of rickety children he does not consider that the effect of this disease is likely to be of much magnitude. It has been suggested that the teeth may become infected from enlarged tonsils, but Gibson thinks that this is highly improbable, as the tendency would be for infection to pass much more frequently from the teeth to the tonsils than in the opposite direction. He admits, however, "That there seems reason to believe that mouth-breathing, consequent on adenoids or hypertrophy of the tonsils, may have a deleterious effect on the teeth, and this may account in some measure for the association observed between caries and enlargement of the tonsils." In conclusion he says, "We have evidence, therefore, of the existence of a correlation of considerable size between dental caries and enlargement of the tonsils, difficult to explain by the assumption of a common cause; rickets, a likely condition, is found to have no association with tonsillar enlargement; the effect of the mouth-breathing, often seen in children with hypertrophied tonsils, in causing caries is found to have practically no share in the formation of this correlation, and there remains only the direct connection by bacterial action, either an infection of the teeth from the tonsils, or an affection of the tonsils by dental caries, owing to saturation with bacteria and with toxins; the evidence points to this latter connection having by far the greatest share in building up the association."

* The Medical Officer, 1911-12, VI, 87.

PUBLIC HEALTH NEWS AND NOTES.

B. L. ARMS, M. D.,
Boston, Mass.
(*Reviewer.*)

The Cholera Situation.* There has been little change in the cholera situation during the past week (Oct. 22). The disease continues prevalent in Italy. Limited outbreaks continue to be reported in various localities in Austria-Hungary. The disease is present at various points in Russia, although to a much more limited extent than during the autumn of 1910. The disease is also present in Turkey in Europe, and an increasing number of cases are occurring in Asia Minor. The outbreak in Tunis is increasing. According to last advices the disease was still present at Marseilles, France.

Precautions for the protection of the United States are being continued. Officers of the Public Health and Marine-Hospital Service are being retained at foreign ports at which emigrants from cholera-infected localities embark for the United States, and the examination of immigrants on arrival at United States ports for the detection of cholera carriers is still being carried on.

Typhoid Investigation at Fort Smith. Dr. W. H. Frost, P. A. Surg. P. H. & M. H. Service, reports† an investigation into the origin and prevalence of typhoid fever at Fort Smith, Arkansas, in which he found 50 per cent. of the cases due to contact, and the balance due to various causes.

Proceedings of Michigan State Board of Health.‡ The Michigan State Board of Health has employed Miss Adele McKinnie, an expert investigator in eugenics from the Eugenics Record Office, Cold Spring Harbor, Long Island, N. Y., as a special medical inspector, to investigate, during the next six months, into the condition and extent of feeble-mindedness and mental deficiency in Michigan. Miss McKinnie's work will begin at the State Home for the Feeble-Minded and Epileptic, at Lapeer, Michigan, under the immediate direction of Dr. George S. Chamberlain, Medical Superintendent of that institution.

With the especial approval of Governor Osborn, the State Board of Health authorized the Secretary to bring about an investigation of the occupational conditions in Michigan, with a view to preventing unnecessary loss of life and health from conditions that can be remedied. This work is to have the immediate attention of the department, and a thorough investigation is to be made of all industrial conditions that affect health and life.

* Public Health Reports, October 20, 1911.
† Public Health Reports, October 27, 1911.
‡ Communication from the Secretary, Dr. R. L. Dixon.

ANNOUNCEMENTS.

American Public Health Association.
Preliminary Program—Havana Meeting.

The program of the Havana meeting will be of more than usual interest. The following papers have already been promised, and these, together with the committee reports, will make it worth while for any member of the Association to attend. Additional papers will doubtless be received later.

GENERAL ASSOCIATION.

Symposium on Cholera.

On Measures Taken by the Canadian Government to Prevent the Introduction and Spread of Cholera in the Dominion of Canada, by Dr. Frederick Montizambert, Director-General of Public Health, Canada.

On Measures Taken by the Cuban Government to Prevent the Introduction and Spread of Cholera in Cuba, by Dr. Juan Guiteras, Director of Health, Cuba.

Measures Adopted by the United States Government to Prevent the Introduction of Cholera into the United States in the Summer of 1911, by Dr. John F. Anderson, Director, Hygienic Laboratory, United States Public Health and Marine-Hospital Service.

Symposium on Tuberculosis.

Dr. Livingston Farrand, Chairman of Committee, Executive Secretary, National Association for Study and Prevention of Tuberculosis, New York.

Symposium on Hookworm Disease.

Dr. John A. Ferrell, Assistant Secretary for Hookworm Disease, North Carolina State Board of Health.

Dr. Bailey K. Ashford, Medical Department, United States Army, Porto Rico Anemia Commission.

Dr. Ch. Wardell Stiles, Chief, Division of Zoology, United States Public Health and Marine-Hospital Service, Scientific Secretary of the Rockefeller Sanitary Commission.

Tropical Diseases in Cuba, by Dr. Enrique B. Barnet, Chief Editor, Department of Sanitation and Charities.

How to Control Communicable Diseases, by Dr. Charles A. Hastings, Medical Health Officer, Toronto, Canada.

Annual Report on Yellow Fever in the Republic of Mexico, by Dr. Eduardo Liceaga, President, Superior Board of Health, Mexico.

Typhoid Fever in Havana, by Dr. Jose A. L. del Valle, Chief Health Officer, Havana, Cuba.

Typhus Fever, in Mexico, by Dr. Jesus E. Monjaras, Secretary-General, Superior Board of Health, Mexico.

Studies of Rural Typhoid Fever in Virginia, by Dr. Allen W. Freeman, Assistant Commissioner of Health, State of Virginia, and Dr. L. L. Lumsden, United States Public Health and Marine-Hospital Service.

Infantile Paralysis, by Dr. Mark W. Richardson, Secretary, Massachusetts State Board of Health.

A Study of Air and Contact Infection at the Providence City Hospital, by Dr. Chas. V. Chapin, Superintendent of Health, Providence, R. I.

On the Milk Problem, by Dr. Ernesto Aragon, Cuba.

The Conservation of Food Products by Refrigeration in its Hygienic and Economic Aspect, by Dr. P. H. Bryce, Chief Medical Officer, Department of the Interior, Canada.

Methods of Sludge Disposal, by Mr. Rudolph Hering, New York, N. Y.

A Device for Keeping Garbage Cans in Place, by Dr. M. E. Connor, General Inspector. Isthmian Canal Commission, Ancon, C. Z.

Sewage Disposal in Saskatchewan, by Dr. M. M. Seymour, Medical Health Officer, Province of Saskatchewan, Canada.

Disposal of Refuse, by Dr. Eugenio S. Agramonte, Cuba.

Disinfection in Havana, by Dr. Gabriel Custodio, Chief Officer of Disinfection, Havana, Cuba.

A Few Hints on Vital Statistics, by Dr. Jorge Le Roy, Chief Statistician, Department of Sanitation and Charities, Cuba.

Passenger Inspections, by Dr. Antonio Cueto, Special Medical Inspector, Havana, Cuba.

House to House Inspection, by Dr. Federico Torralbas, Chief of Sanitary Inspection, Havana, Cuba.

History of the Adoption on the American Continent of Bertillon's Nomenclature, now International, of Causes of Deaths and Disease, by Dr. Jesus E. Monjaras, Secretary-General, Superior Board of Health, Mexico.

Laboratory Section.

FIRST SESSION.

Chairman's Address—Problems of the Future, Dr. John A. Amyot.

Disinfectants:

1. Further Observations on the Chemistry of Disinfectants, by Dr. Wm. Dreyfus, New York City.
2. Experimental Studies on the Action of Germicides, by Dr. E. C. Howe, New York, N. Y., Introduced by E. B. Phelps, New York City.
3. Further Work with the Hygienic Laboratory-Phenol Coefficient, by Dr. John F. Anderson and Dr. Thomas B. McClintic, U. S. P. H. & M. H. Service, Washington.
4. Report of Committee on Standard Methods for the Bacterial Examination of Disinfectants, by E. B. Phelps, Chairman, New York City.

SECOND SESSION.

Vaccine Virus.

1. The Preparation of Dried Vaccine Virus, by Dr. W. F. Elgin, Glenolden, Pa.
2. Report of Committee on Standard Methods for Preparing Smallpox Vaccine, by Dr. J. H. Huddleston, Chairman, New York City.

Rabies.

3. Further Studies on the Virulence of Desiccated Rabic Material, by Dr. D. L. Harris, St. Louis.
4. Report of Committee on Standard Methods for the Diagnosis of Rabies, by Dr. V. A. Moore, Chairman, Ithaca.

Syphilis.

5. Report of Committee on Standard Methods for the Biological Diagnosis of Syphilis, by Dr. Herbert U. Williams, Chairman, Buffalo, New York.

Glanders.

6. Report of Committee on Standard Methods for the Bacterial Diagnosis of Glanders, by Dr. W. L. Beebe, Chairman.

Tuberculosis.

7. Report of Committee on Standard Methods for the Bacterial Diagnosis of Tuberculosis, by Dr. Mazyck P. Ravenel, Chairman, Madison, Wis.

Water.

8. Report of the Committee on Standard Methods for the Bacterial Analysis of Water and Sewage, by Mr. D. D. Jackson, Chairman, New York City.
9. Preservation of Water Samples by Salting, by Drs. Mazyck P. Ravenel and K. W. Smith, Madison, Wis.
10. The Hygiene of Swimming Pools, by Mr. E. J. Tully, Madison, Wis.
11. Report of the Committee on Standard Methods for the Chemical Analysis of Water and Sewage, by Mr. Robert Spurr Weston, Chairman, Boston.
12. Composition of Gases Formed by Decomposition of Organic Matter, by R. H. Jesse and E. Bartow.

Milk.

13. An Inspector's Inexpensive Outfit for the Collection of Bacterial Milk Samples, by Dr. F. O. Tonney, Chicago.
14. A Portable Apparatus for the Determination of Visible Dirt in Milk, by Dr. F. O. Tonney, Chicago.
15. Report of the Committee on Standard Methods for the Bacterial Examniation of Milk, by Dr. Francis H. Slack, Boston.
16. Report of the Committee on Standard Methods of Chemical Milk Analysis, by Mr. J. O. Jordan, Boston.

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17. Report of the Committee on Standard Methods for the Examination of Air, by Mr. C.-E. A. Winslow, Chairman, New York City.
18. Report of the Committee on Mailing Infectious Material, by Dr. M. L. Price, Chairman, Baltimore.

THIRD SESSION.

1. Report of the Committee on Standard Methods for the Bacterial Diagnosis of Typhoid Fever, by Dr. Allen W. Freeman, Richmond, Va.
2. Report of the Committee on Standard Methods of Preparing Diphtheria Antitoxin, by Dr. P. G. Heinemann, Chairman, Chicago.
3. Report of the Commitee on Standard Methods of Preparing Tuberculin and Mallein, by Dr. Marion Dorset, Chairman, Washington.
4. Report of the Committee on Standard Methods for the Bacterial Examination of Shellfish, by Mr. G. C. Whipple, Chairman.
5. Miscellaneous business.

No information has been received relative to the programs of the Section on Vital Statistics and the Municipal Health Officers Section, but it is understood that the program committee of each of these Sections has been actively at work and that papers and committee reports will be up to the standard heretofore set by these Sections.

Members of the Association having papers, reports, or other matters that they want to bring before the Association or before any of the Sections are requested to submit them as soon as possible to the Secretary of the Association, or, if it relates to the work of any Section, then to submit it to the proper officer of the Sections named below. In every case, if possible, an abstract of the paper or report that it is proposed to present should be sent to the chairman of the proper program committee at least thirty days before the meeting, so as to permit the arrangement and printing of the program before the Association meets.

General Association—Dr. Wm. C. Woodward, Secretary, Washington, D. C.

Laboratory Section—Dr. John F. Anderson, Chairman, Committee on Program, Washington, D. C.

Vital Statistics Section—Dr. John S. Fulton, Chairman, Committee on Program, Washington, D. C.

Municipal Health Officers Section—Dr. Federico Torralbas, Chairman, Committee on Program, Havana, Cuba.

Sociological Section—Mr. John M. Glenn, Chairman, 105 East 22nd St., New York, N. Y.

Sanitary Engineering Section—Col. J. L. Ludlow, Chairman, Winston-Salem, N. C.

If no formal meetings of the Sociological and Sanitary Engineering Sections are held, places for papers intended primarily for presentation to those Sections will be found in the program of General Association or in the program of one of the other Sections.

COMMITTEE MEETINGS. The Committee of Seven, the Executive Committee, and the Committee on Membership will meet on Monday, December 4, 1911, at hours and places to be announced hereafter.

EXHIBIT.

The Department of Sanitation of Cuba will have an exhibit of its various methods and appliances of sanitary interest. It is hoped that Mexico and the Canal Zone may also be represented.

RAILROAD AND STEAMSHIP RATES.

No special rate to Havana has been granted, except that given by the Ward Line, sailing from New York. Members of the Association desiring to go to and from Havana over that route can leave New York on Wednesday, November 29th, on the Steamship Morro Castle, which will reach Havana on the following Sunday evening or Monday morning. Originally, and the announcements sent out by the Ward Line so stated, return on these special tickets was permitted only on the boat leaving Havana on

December 9th. The steamship company has, however, agreed to extend the return portion of round trip tickets until any time in December. The limit will be the last sailing from Havana to New York, which will be on Saturday, December 30th. If any members of the Association prefer to return to New York through Santiago, via Nassau, the Ward Line has expressed its willingness to take the matter up and meet their wishes by making special arrangements for them. Address: New York and Cuba Mail Steamship Company, Pier 14, East River, New York. Reservations should be made as promptly as possible to insure against disappointment.

For information as to railroad routes and rates, members are advised to inquire of their local ticket agents.

HAVANA NOTES.

PLACES OF MEETINGS. The headquarters of the Association will be at the Hotel Sevilla. The general meetings will be held in the rooms of the Ateneo and Circulo de la Habana. The Laboratories and the University will be used for the meetings of the Laboratory Section. Suitable accommodations will be provided for the Section on Vital Statistics and for the Section of Municipal Health Officers.

ENTERTAINMENT. Through the courtesy of the people of Havana, ample entertainment has been provided, arranged, however, with due regard to the business and scientific meetings of the Association. The main social features will be a trip to a tobacco plantation, a banquet at the National Theater, a picnic on the grounds of la Tropical Brewery, a Spanish-Cuban Verbena at the Hotel Sevilla, a trip to Morro Castle, Cabanas, and Triscornia Detention Camp, and a visit to the "Maine."

HOTEL ACCOMMODATIONS. Hotels available for members of the Association and others attending the meeting, are:

HOTEL SEVILLA. Headquarters of the Association—European plan, $2.00 up. American $5.00. Bath and telephone in every room.

HOTEL INGLATERRA. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

PLASA HOTEL. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

HOTEL PASAJE. European plan, $2.00 up. American $4.00 up. Bath and telephone in every room.

HOTEL TELEGRAFO. European plan, $2.00 up. American $5.00 up. Bath and telephone in every room.

Reservations may be made by writing directly to the hotels named or to the Secretary of the Local Committee on Arrangements, Dr. Federico Torralbas, Tejadillo, 36, Havana, Cuba.

COMMUNICATIONS.

A SANITARY INSTITUTE FOR AMERICA.—A WORD OF ENDORSEMENT.

To the Editor:

After reading the article by P. B. Tustin in the June number of the Journal of the American Public Health Association, I hoped that a number of the public health officials of America would voice their views of the question discussed by him. It seems to me a matter of great importance that such a sanitary institute should be founded for America, especially since in the United States there is no federal body with authority to certify to the qualifications of health and sanitary officers.

It is my personal belief that state health organizations will eventually be organized on much the same plan as those of our large cities; that they will be organized as departments under commissioners, and will succeed in large measure to the powers and duties now exercised by the local boards of health of small cities, towns and rural districts. I can see no more reason for each little town or each county maintaining a separate health organization than for each ward of a city doing so. We need better qualified men, and men whose interest is in public work rather than in private practice. To get the full time of such men means increased salaries; to give such men something to work with means increased appropriations; and to ask each small city, town, or county to provide such increased grants of money is asking for what they will not, and probably should not, give.

If the local control be surrendered to the state, the size of the sanitary unit can be increased, a few thoroughly competent men can be employed to direct the health affairs of the district, with a number of lay inspectors and visiting nurses working under them. We are centralizing our organizations for the collection of vital statistics, after failing uniformly to obtain satisfactory results under local systems with loose central direction. Why not centralize in other lines?

The answers to this have been: (1) The insecurity of tenure, and (2) the danger of the department coming under political control and being misused for political purposes. The preventive for both these contingencies is a civil service and because in many of our states there are few, if any, who are competent to judge of the qualifications of applicants, I believe a capable central body, which will certify to the qualifications of all candidates for positions in public health departments, is a necessity of the greatest importance.

The idea of a sanitary institute for America appeals to me forcibly, and I desire to endorse it.

EDWARD. L GODFREY, JR.
Superintendent of Public Health, Arizona.

BOOK REVIEW.

Public Hygiene, by Thomas S. Blair, M. D., Neurologist, Harrisburg, Pa., Hospital, author of "The Practitioner's Handbook of Materia Medica" and "The Practitioner's Handbook of Modern Medical Treatment, Etc." Assisted by numerous contributors. In two volumes. 158 illustrations. Richard G. Badger, The Gorham Press, Boston.

"This book," says the author in his preface, "is the personal investigation of public hygiene from the standpoint of a seasoned general practitioner." From his survey of public hygiene he has discovered that the subject "has developed too much as a specialty and needs the tempering conclusions of the whole body of the medical profession." "The great American public having joined hands with the doctor, this medical book aims to present what the intelligent laymen are doing, and offers for their study much that is of joint interest to them and to the physicians." For, "so far as ascertained, this is the first effort to present a work upon this especial point of view in the great domain of public health."

There are sixteen contributors to the work, twelve collaborators, not including a committee of the Harrisburg, Pa., Academy of Medicine, while many individuals and organizations have supplied data, reprints, reports, etc., or have delegated assistants to aid the editor.

This book consists of pages of generalities, interspersed with several good chapters, notably those on the "Slums and Town Nuisances," by J. Horace McFarlin, and "Special Rural Hygiene and Sanitation," prepared from numerous reports of organizations and departments. The hygiene and sanitation taught in the book may be judged by the following quotations:

We are taught that "churches, schools, the Mayor's office and the city library have all been closed for fumigation, when any public danger was apprehended"; that "hospitals should disinfect rooms regularly every three months"; that "in time of serious epidemic it is necessary to close the places of public gathering for a short time and to fumigate and disinfect well before opening to the public."

In the treatment of epidemics the author says: "In our elaborated civilization, the facilities for preventing epidemics are so efficient, that the danger of attacks of contagion are so slight that an undue degree of excitement is often worked up." We are also told, that "cellar air is largely the house air, and much sickness is caused by cellar air."

In the chapter, "School Inspection and College Sanitation," we are told that "the primal object of medical inspection is the daily visitation for the detection of communicable diseases," and that "one physician devoting from one to two hours each school day and assisted by one nurse, can take care of from 6,000 to 8,000 pupils during an ordinary school year." "The nurse in administration must be under the inspector (medical school). In brief, her work consists of clerical duties."

The registrars of vital statistics will doubtless be interested in "The seaside resorts are the most healthy in the world as regards permanent population," and

"the *Proper** death rate is among the lowest." This doubtless has a relation to the man who wrote a death certificate: "Died from an overdose of Rough on Rats."

We are told that "Cornell (?) Pennsylvania and Michigan train health officers." No mention is made of the work of Harvard, and Cornell, of course, has no training for health officers. The course referred to is, doubtless, the course of Sanitary Science for Students.

We are told, too, that "the cough prescribed for develops into whooping-cough."

The book is loose in statement; has such expressions as "put on a front"; is without plan, and has a small place in the history of hygiene and sanitation.

GEO. W. GOLER.

* Italics in original.